S. Hrg. 100-561

THE IMPACT OF FEDERAL INSPECTION SERVICE PROTEIN MEASUREMENT ON WHEAT PRICES

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON AGRICULTURAL PRODUCTION
AND STABILIZATION OF PRICES

OF THE

COMMITTEE ON AGRICULTURE,
NUTRITION, AND FORESTRY
UNITED STATES SENATE

AND THE

SUBCOMMITTEE ON
WHEAT, SOYBEANS, AND FEED GRAINS

OF THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDREDTH CONGRESS

FIRST SESSION

ON

FEDERAL GRAIN INSPECTION SERVICE'S CHANGE IN GRAIN PROTEIN
MEASUREMENT

NOVEMBER 10, 1987

Serial No. 100-66

(House Committee on Agriculture)

Printed for the use of the Senate Committee on Agriculture, Nutrition, and Forestry and the House Committee on Agriculture

U.S. GOVERNMENT PRINTING OFFICE
83-530 WASHINGTON : 1988

For sale by the Superintendent of Documents, Congressional Sales Office
U.S. Government Printing Office, Washington, DC 20402

H 161-42
S161-1.9

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[1] Resigned from committee October 21, 1987.

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THE IMPACT OF FEDERAL INSPECTION SERVICE PROTEIN MEASUREMENT ON WHEAT PRICES

TUESDAY, NOVEMBER 10, 1987

U.S. SENATE,
SUBCOMMITTEE ON AGRICULTURAL PRODUCTION
AND STABILIZATION OF PRICES OF THE
COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, DC.

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON WHEAT, SOYBEANS, AND FEED GRAINS,
COMMITTEE ON AGRICULTURE,
Washington, DC.

The subcommittees met, pursuant to notice, at 10:01 a.m. in room 332 of the Russell Senate Office Building, Hon. John Melcher (chairman of the Subcommittee on Agricultural Production and Stabilization of Prices) presiding, together with Hon. Dan Glickman (chairman of the Subcommittee on Wheat, Soybeans, and Feed Grains).

Present or submitting a statement: Senators Melcher, Conrad, and Boschwitz; Representatives Glickman, Johnson, English, Marlenee, and Schuette.

STATEMENT OF HON. JOHN MELCHER, A U.S. SENATOR FROM MONTANA

Senator MELCHER. The subcommittees will come to order. This morning, the subcommittee, with its counterpart in the House—chaired by Congressman Glickman and with Congressman Marlenee as the ranking member on that subcommittee and Congressman Johnson, the South Dakota Member of that subcommittee in the House—are holding joint hearings to get down to bedrock on just what has been happening in the Federal Grain Inspection Service regarding measurement of the protein content on wheat.

The disturbing aspect of this episode in the Federal Grain Inspection Service history is that the procedures for calculating what the protein content during the past several months has been altered, and altered without written approval or direction, as is generally the case.

We have witnesses today from Montana and Washington that will trace the events that occurred. We will also hear from the Department of Agriculture, from the Federal Grain Inspection Service, on just what justification they had for the changes in the calculations of the protein content, and we will expect to hear some rationale as to why these changes were not made in the customary form. We will expect the Federal Grain Inspection Service to tell us in detail why they're making changes. The changes were not made by written orders or direction.

The question in my mind about matters that affect the pocketbooks of the grain producers themselves in changing the method of calculation of protein—simply put is this. There's a lot of money involved. Is there anything in our law that permits the tampering or the adjustment of the procedures for determining what the protein content is without doing it by direction, public knowledge, and everybody being informed of exactly what is going on.

In earlier meetings with the Director of the Federal Grain Inspection Service, I asked that this matter be either justified or at least an overview given by the Office of Inspector General of the Department of Agriculture. We will see what came of that.

In the meantime, let this be known, that we view this as a very serious matter. We are here to learn the facts. We are here to listen to both sides, and we are here in our capacities as Representatives of our States to make sure that we have an honest performance by the Federal Grain Inspection Service.

Congressman Marlenee.

STATEMENT OF HON. RON MARLENEE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MONTANA

Mr. **Marlenee**. Thank you, Mr. Chairman, Senator. I appreciate you for holding this hearing, and I also appreciate the fact that the chairman of the House Subcommittee on Wheat, Soybeans, and Feed Grains, Mr. Glickman, over in the Agriculture Committee on the House side, has consented to working toward this joint hearing. I think that with this joint hearing we can get to the bottom of the matter rather quickly. I appreciate, again, the opportunity for this airing of the problem.

It is a most important matter. It involves millions of dollars in underpayments to wheat producers in several States. But, more importantly, I believe, Senator, that it involves the credibility of the Federal Grain Inspection Service itself. Our producers have to rely on the Federal Grain Inspection Service for an accurate reading if they are not to be underpaid, and the foreign buyers need to have full confidence that the Federal Grain Inspection Service is, in fact, accurately testing if we are to continue to sell a quality product and assure those buyers that they are receiving, in fact, what we say that they should be getting.

This is not a kangaroo court or inquisition, but I would emphasize that we expect a very candid and truthful response to the questions that we are going to give the witnesses and, because of that, I am not going to ask that the witnesses be sworn in. However, I do think that that is an option that we should preserve. Certainly, if evidence is forthcoming throughout this hearing that we are not getting the forthright answers that we seek, then I would certainly urge that the witnesses be sworn in, or that we have another hearing where, in fact, they are sworn in. I think we can accomplish that.

I don't want to delay the hearing here. I want to hear from the witnesses, but I just want to take a minute to outline the situation that we will be discussing here. Hard Red Spring and Hard Red Winter wheats are extremely important to the areas that we serve, Mr. Johnson serves, Mr. Glickman, myself, and you, Senator.

The protein content of that grain is extremely high, generally, and the underpayments have a more serious impact, or the recalibration of the testing equipment has a more serious impact on this area than it does on any other area in the United States of America.

Most recently, the Department switched rather suddenly, rather suddenly, without the opportunity for adjustment by producers, to the 12 basis moisture formula. Now, that's a complicated formula—and don't ask me to explain it, nor ask our producers to understand it. But that, coupled with the reduction in the testing equipment, which is a separate issue, of two-tenths and two-tenths has amounted to a significantly—and I might add, devastating impact on the income that producers are receiving in our particular area.

I have introduced a piece of legislation very recently, along with Chairman Glickman and Mr. Roberts, Mr. Smith and Mrs. Smith of Nebraska—Mr. Smith of Oregon—that would address this 12 moisture basis problem, the formula problem that we face in these States.

Of greater concern with this hearing are allegations that FGIS is operating the protein measurement program, that they made other efforts which further penalized the producer, as I have referred to, by incorrectly lowering the protein measurement used to determine the premiums and discount. It would appear—and I emphasize "appear"—that FGIS officials and employees discovered the mistake, that it was first not immediately corrected, and that subsequent steps to correct the mistake were handled in a very unusual and surreptitious manner, such a manner as to suggest that attempts were being made to cover up the original error. To this date, the original mistake has not been completely reversed, and there is evidence that FGIS is, and was, fully aware that for some period of time the official grain laboratories in the State of Washington were using a lower calibration on their Near Infrared Reflectance machines than were the labs in Montana, Idaho, and other States, resulting in further losses to producers and damages to grain dealers.

Now let me emphasize that they knew, at a date certain, that these calibrations were to go up on these machines, as will be outlined in the testimony before us this morning, and yet steps were not taken to correct that at the State of Washington, which is one of the ultimate destinations and one of the final testing points, and it is the basis upon which the foreign buyers buy the grain and pay for the grain. And why those steps were not taken to raise that is one of the issues that I want to get to and get to the bottom of here this morning.

If it is a mistake—and we all make mistakes—then I would like to hear statements that, in fact, that problem did exist and that we need to correct it, and it should be corrected immediately, and figure out how to repair the damages and compensate the producers who may have, in fact, suffered loss from an error of omission or commission, or whatever the problem may be.

I would ask, Senator, that my statement in its entirety be included in the record.

Senator MELCHER. It will be made a part of the record in its entirety.

[The prepared statement of Mr. Marlenee follows:]

OPENING STATEMENT BY MR. MARLENEE

WHEAT PROTEIN HEARINGS

Thank you Mr. Chairman:

I want to commend you for calling this hearing in such speedy fashion, and I also want to thank the Chairman of our House Subcommittee on Wheat and Feed Grains, Mr. Glickman, for consenting to hold this session jointly.

This is a most important matter, Mr. Chairman. It involves what we believe are millions of Dollars in underpayments to wheat producers in several states. But, more importantly, it involves the credibility of the Federal Grain Inspection Service which foreign buyers of U. S. wheat rely upon to accurately certify the quality of our farmers' product. Quite simply, if FGIS cannot be relied on to operate the grain inspection program in an orderly and accurate fashion, then foreign sales will be harder to make and our own producers will not be fairly paid.

This is not a "kangaroo court" or "inquisition" we are holding here this morning. But, I want all of the witnesses--and especially those representing F.G.I.S.--to understand the serious nature of this session, and the need for them to be completely honest and candid. In faith that this problem can be satisfactorilly resolved, we have not asked that witnesses be sworn for their testimony here today. But, that certainly is an option at some later date if this panel has reason to believe that the truth is not totally forthcoming during today's hearing. If mistakes have been made in the manner in which F.G.I.S. has managed the wheat protein measurement program, then we need to simply admit that and work to make certain the same does not happen again in the future and find a way to compensate producers who were shortchanged and dealers who may have also been damaged by the mistake.

I do not wish to delay getting underway with the witnesses, Mr. Chairman, but I think we should take just a minute to outline the situation we will be discussing here today.

Producers of Hard Red Spring and Hard Red Winter wheats have experienced a rather significant reduction in prices paid for their product in those states where the average moisture content falls below 12 percent. This resulted because F.G.I.S. adopted a new "standard moisture basis" method for measuring protein content in those types of wheat. The change was, I believe, rather sudden and did not give growers adequate notice so they could adjust their income projections and operations to reflect the new basis for determining protein premiums and discounts. As a result, I introduced H.R.3159, in which Chairman Glickman, Mr. Roberts, Mr. Smith of Oregon, and Mrs. Smith of Nebraska joined me. That is one topic which concerns us this morning, and on which I believe we have asked other interested parties to submit written testimony.

But, of even greater concern are allegations that F.G.I.S. in operating the protein measurement program made other errors which further penalized wheat producers by improperly and incorrectly lowering the protein measurement used to determine premiums and discounts. It would appear that after F.G.I.S. officials and employees discovered this mistake, that it was first not immediately corrected, and that subsequent steps taken to correct the mistake were handled in such an unusual and surreptitious manner as to suggest an attempt was being made to "cover up" the original error. To this date, the original mistake has not been completely reversed, and there is evidence that F.G.I.S. was fully aware that for some period of time the official grain laboratories in the state of Washington were using a lower calibration on their Near Infrared Reflectance machines than were the labs in Montana, Idaho and other states resulting in further losses to producers and damages to grain dealers.

It is this second area which concerns me the very most this morning, Mr. Chairman. I think the Department has indicated at least a willingness to work together regarding a proper legislative or administrative remedy for the first problem--the sudden and unexpected impact of adopting the 12 percent moisture basis. I would hope that they will also be honest with us regarding our second and more serious area of concern. If a mistake was made--and we will hear testimony today that F.G.I.S. officials have made statements to that effect--then let's face up to it, get it corrected, and figure out how to repair the damage.

Senator **Melcher**. Congressman Johnson.

STATEMENT OF HON. TIM JOHNSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH DAKOTA

Mr. **Johnson**. Yes. Mr. Chairman, I want to commend you and Chairman Glickman, as well, for calling this joint hearing on a very critical issue facing those of us in agricultural America, particularly our States that produce a great amount of wheat.

There have been growing complaints about the quality of U.S. grain exports over a number of years now. I think that we're here to listen to this testimony, to learn more about what has been going on in FGIS, and I am not going to draw quick conclusions prior to that testimony. I do believe, however, that while a 12 percent figure may be too high or too low, there may be other adjustments which are in order. I think that my inclination at this point is to believe that going back to an as is basis may not be the answer, that we may need a uniform moisture basis, as other countries do have.

At least all grain inspection certifications currently now are stated as if the moisture content is constant and uniform. I am interested in seeing if there are additional changes that need to be made, changes that would be equitable to our wheat growers all across our States. I think that any retreat back to the former process may be a cure that is worse than the illness. But I am interested in listening to further testimony from FGIS and from the wheat growers themselves.

I want to thank you, Mr. Chairman.

Senator **Melcher**. Senator Boschwitz, do you have an opening statement?

Mr. **Boschwitz**. None.

Senator **Melcher**. Chairman Glickman.

Mr. **Glickman**. Thank you, Mr. Chairman. I'm sorry to be late. I look forward to this hearing, and I appreciate you and Mr. Marlenee bringing this to our attention. I look forward to hearing the witnesses.

Senator **Melcher**. Our first witness this morning will be a panel from Montana of Gregg Holt, president of the Montana Grain Growers Association; Keith Kelly, Director of Montana Department of Agriculture; and Rex Denning, Chief Grain Inspector, Department of Agriculture, Grain Standards Bureau in Montana.

Please proceed.

STATEMENT OF GREGORY B. HOLT, PRESIDENT, MONTANA GRAIN GROWERS ASSOCIATION, GREAT FALLS, MT

Mr. **Holt**. Mr. Chairman, members of the committee, I appreciate this opportunity to meet with you today concerning matters related to the USDA Federal Grain Inspection Service.

My name is Gregg Holt and I am the current president of the Montana Grain Growers Association. Our association is made up of wheat and barley producers from throughout the State of Montana. I am a farmer, and we operate wheat farms in northern Montana.

Farmers, grain elevators, and exporters are highly dependent upon fair, honest and accurate grading of our grain by the Federal

Grain Inspection Service. This is particularly important in high protein Spring wheat where large premiums are paid or discounts taken, based on protein levels of this wheat. Current Spring wheat prices being paid to farmers at Montana elevators are varying from 12 to 16 cents for each quarter increment of a percentage point variation in the protein level of the grain. Even 0.1 percent reduction in the protein measurement of a particular grain sample can often result in a full quarter less protein premium, and 12 to 16 cents less per bushel in the price paid to the farmers.

On June 15, the Federal Grain Inspection Service field office supervisors instructed the field labs to raise the Hard Red Spring wheat protein baseline by 0.1 of a percent, beginning at 8 a.m. on June 16. It was indicated to our labs that this change would be verbal only, which is a very highly irregular procedure for that type of change. On July 2, the Montana State Grain Lab sent a letter to the FGIS requesting written documentation of this ordered change. In response, they received another phone call that said, "No, we're not going to give you any written documentation. This is all being handled verbally, and we don't want anything in writing that would indicate that we are making this change." This particularly bothered our folks in the Montana Grain Lab, and they reported this incident to their supervisors in the State of Montana.

From the evidence that we have pieced together over the last few months, it appears that a protein machine calibration error was made by the FGIS on May 4, 1987, which has seriously affected the prices U.S. farmers have received on their Hard Red Spring wheat since that date.

On April 15, the Federal Grain Inspection Service announced that it was adjusting the baseline downward on its near infrared reflectance [NIR] machines by 0.2 of a percent to bring their machine calibration in line with those of our foreign buyers. I would like to point out there, sir, for the purposes of this hearing we, as farmers, have no argument with that adjustment. We think that it apparently was necessary in order to move our product, and that initial 0.2 of a percent is not an issue in this hearing, nor is the move to the 12 percent moisture basis an issue in this particular proceeding.

On May 4, someone apparently made a mistake and ordered an additional 0.2 percent reduction in the protein baseline on the new Hard Red Spring wheat samples which had been sent out to the labs in April, reflecting the new change to the 12 percent moisture basis. So, in effect, what we have had here is two 0.2 of a percent reduction in the protein baseline on Hard Red Spring wheat.

We are not sure when the error was originally discovered by FGIS, but the first evidence of an attempt to correct the situation was the 0.1 of a percent increase which was ordered verbally on June 15. Efforts were made by our Montana State Department of Agriculture to get an explanation for some of the things that had taken place, and letters were sent to various individuals, including FGIS Administrator Kirk Miller.

I would point out one small correction in my prepared testimony, if any of you have a copy of the prepared written testimony. In the latter part of that second sentence on the second page where it refers to the reduction which occurred on May 4. The prepared testimony says 0.1 of a percent. That should read 0.2 percent reduction on May 4.

This incident is only one of many issues which raise questions as to some of the operational procedures currently being employed within the USDA Federal Grain Inspection Service.

On this particular issue, we respectfully request that the Senate Subcommittee on Agricultural Production and Stabilization of Prices and the House Subcommittee on Wheat, Soybeans, and Feed Grains immediately begin an investigation of this Hard Red Spring wheat protein incident. We further request that if the errors in the protein machine calibration did occur, as suspected, that they be corrected immediately so that farmers receive proper compensation for the Spring wheat they produce. Further, we ask that reparations be made to farmers who have suffered financial losses due to the protein machine calibration error and the subsequent efforts to conceal this from the general public.

Let me give you some feel for the perspective as to the economic impact this protein measurement error has had on Montana's farmers. With nearly 5 million bushels of Hard Red Spring wheat being marketed in Montana each month, at today's 14 cents per quarter percent protein premium, it could mean Montana farmers have lost somewhere in the neighborhood of $700,000 per month over the last 6 months, as a result of this calibration error. This amounts to $4 million lost revenue to our farmers, which they should have received had the machine not been calibrated incorrectly. This loss is multiplied many times when all Hard Red Spring wheat producing States are included in that total.

I thank you for your time. I appreciate the subcommittees looking into this matter, and I will be happy to answer any questions at the appropriate time. Thank you.

[The prepared statement of Mr. Holt follows:]

STATEMENT OF GREGORY B. HOLT, PRESIDENT MONTANA GRAIN GROWERS ASSOCIATION

Mr. Chairman, members of the Committee, I appreciate the opportunity to meet with you today concerning matters related to the U.S.D.A. Federal Grain Inspection Service. My name is Gregg Holt and I am the current President of the Montana Grain Growers Association. Our Association is made up of wheat and barley producers from throughout the state of Montana. My family owns and operates two dryland farms in northcentral Montana where spring wheat, winter wheat and barley are our primary crops.

Farmers, grain elevators, and exporters are highly dependent upon fair, honest and accurate grading of our grain by the Federal Grain Inspection Service. This is particularly important in high protein spring wheat where large premiums are paid or discounts taken based on the protein levels of this wheat. Current spring wheat prices being paid to farmers at Montana elevators are varying from 12 cents to 16 cents for each quarter increment of a percentage point variation in the protein level of the grain. Even 0.1% reduction in the protein measurement on a particular grain sample can often result in a full quarter less protein premium and 12 to 16 cents less per bushel in the price paid to the farmers.

On June 15th, the F.G.I.S. Field Office Supervisors instructed the field labs to raise the hard red spring wheat protein baseline by 0.1%, beginning at 8:00 a.m. on June 16th. That in and by itself sounds good for the producer, but the phone calls from the F.G.I.S. Field Supervisors ordering this increase indicated to the labs that this change would be verbal only. I am told that this is a highly irregular procedure and as a result, some labs refused to make the change without the normal written documentation. On July 2nd, the Montana State Grain Lab sent a letter to Mr. Larry Zehm, Field Office Supervisor, Moscow, Idaho, asking for written documentation of the ordered change. In response, they received another phone call informing them there would be no written documentation. At this point, it became apparent that something was wrong.

From the evidence that has been pieced together over the last few months, it appears that a protein machine calibration error was made by the F.G.I.S. on May 4, 1987, which has seriously affected the prices U.S. farmers have received on their hard red spring wheat since that date.

On April 15th, the Federal Grain Inspection Service announced that it was adjusting the baseline downward on its near-infrared reflectance (NIR) machines by 0.2% to bring their machine calibration in line with those of our foreign buyers. I have no argument with this adjustment. A new set of hard red spring wheat samples were prepared and sent out to all F.G.I.S. labs with instructions they were to go into effect on May 4th.

But, on May 4th, someone apparently made a mistake and ordered an additional 0.2% reduction in the protein baseline on the new hard red spring wheat samples in which the conversion had already been made. Inadvertently, a 0.2% reduction became a 0.4% bias correction.

We are not sure when the error was discovered by F.G.I.S., but the first evidence of an attempt to correct the situation was the 0.1% increase on June 15th. Further, it was informally indicated that F.G.I.S. would raise the baseline an additional 0.1% at some point in the future. We believe this was intended to fully correct the error of May 4th. But, this second correction has never happened.

Montana State Department of Agriculture Director, Keith Kelly wrote to F.G.I.S. Administrator, Kirk Miller on October 6th requesting a written explanation of the hard red spring wheat protein measurement situation. After today's hearing date was set, Kirk Miller, on October 30th, sent his response without reference to either the 0.1% reduction on May 4th or the 0.1% undocumented increase, on June 15th.[2]

This incident is only one of many issues which raise questions as to the operational procedures currently being employed within the U.S.D.A.'s Federal Grain Inspection Service.

On this particular issue, we respectfully request that the Senate Subcommittee on Agricultural Production and Stabilization of Prices and the House Subcommittee on Wheat, Soybean and Feed Grains immediately begin an investigation of this hard red spring wheat protein incident. We further request that if the errors in protein machine calibration did occur as suspected, that they be corrected immediately so that farmers receive proper compensation for the spring wheat they produce. We ask that reparations be made to farmers who have suffered financial losses due to the protein machine calibration error.

Let me give you some perspective of the economic impact this protein measurement error has had on Montana's farmers. With nearly 5 million bushels of hard red spring wheat being marketed in Montana each month, at todays 14 cents per quarter percent protein premium, it could mean Montana farmers have lost somewhere in the neighborhood of $700,000 per month over the last six months, as a result of this proten calibration error. This $4,000,000 loss is multiplied many times when all hard red spring wheat producing states are included.

I thank you for your time. I'll be happy to answer any questions the Committee may have following the presentations of the other witnesses.

Senator **Melcher**. Thank you, Gregg.

We will hear next from Keith Kelly.

STATEMENT OF KEITH C. KELLY, DIRECTOR, MONTANA DEPARTMENT OF AGRICULTURE, HELENA, MT

Mr. **Kelly**. Thank you, Senator Melcher. For the record, my name is Keith Kelly, Director of the Montana Department of Agriculture, and I have served in that capacity for 5 years now.

Mr. Chairman and members of the committee, I appreciate this opportunity to discuss what I believe are some serious problems that relate to FGIS's procedures for determining protein in Hard Red Spring wheats produced in Montana and other Northern States.

A brief background may be in order to understand our relationship with the USDA/FGIS. Every 3 years, the Montana Department of Agriculture enters into an agreement, which is more commonly referred to as the "Designation as an Official Agency for Official Inspection Under the U.S. Grain Standards Act, as amended."

The designation allows the Montana Department of Agriculture to perform all functions in accordance with and complies with Federal laws.

Our current designation will terminate on August 31, 1990.

It was during the latter part of June of this year that it was brought to my attention of several procedural and technical problems involving FGIS procedures that may have cost Spring wheat producers in Montana several millions of dollars.

Today, I wish to bring to light a number of those problems that we encounter in managing an official statewide protein program in Montana. And as you know, Senator Melcher and Congressman Marlenee, how important protein is to our producers in our States.

Some of those problems are: the failure of FGIS to return information required for accurate program and meaningful records in a timely manner to verify program accuracy. Again, in a timely manner, it is a failure to return needed information relevant to the present protein conditions. We have some feelings out there among our technical people, a lack of comprehensive area-to-area comparisons; a failure of FGIS to use enough samples for meaningful results so that the confidence is in the program.

Right now, we are running on standard reference samples for Hard Red Spring and Hard Red Winter of 5 and 5 each; we feel strongly that there ought to be 10 of each of those samples to run. We also believe it may be helpful to keep confidence in the program of direct comparison samples with FGIS and other official agencies, on a biweekly basis that you could pass around. This is not done at the present time.

I am going to go through a brief chronology of some of the things that went on, and I will paraphrase and condense some of those, that we have been dealing with in the last several months, that I think just shows some administrative problems that need to be, somehow, corrected.

In November 1986 we began trying to correct known inaccurate Spring and Durum wheat standard reference sample values, and I have got the attachments 1 and 2 for that. It was November 1986 through April 1987 that we continually requested from the Moscow field office for assistance with this problem.

In March 1987 we sent the standard reference samples with suspected inaccurate assigned values to Kansas City for testing. We received no results from Kansas City; and after continually requesting required information from the Moscow field office, who we initially report to, Moscow, Idaho—we were told that Kansas City would not give us individual corrected sample values, but our baseline value was close.

We explained that we had requests in the State of Montana to examine our protein records on a regular basis from the grain trade or from growers and without correct values, our records indicate we are running an inaccurate program. We are suspect to running that if we don't have anything to back it up. Attachments 1, 2, 3, and 5 are there for your reference to refer to that.

We were told by our Moscow field office that the reason for not providing revised values was that new national SRS samples would be put into use very soon. But we didn't receive those new spring standard reference samples until mid-April of 1987.

I will just paraphrase down, and go on to August 13, 1987. We were told by our Moscow field office we had a problem there with regards to a couple of samples in there, that they were told to disregard the results on a spring standard reference samples Numbers 1 and 6, as they were due to be replaced. They weren't reading out correctly each time. So mid-August, we received replacement for those spring SRS samples Numbers 1 and 6. We have done a lot of shipping, and we are still waiting for instructions to put these samples into use. We have not done that, as of yet. And refer to attachment 4 on that.

Several other chronological events are there that, I guess just administratively, I think, would help us a lot better to make sure that we have the confidence level in the program in Montana.

Some rhetorical questions that one may ask—I guess we would ask in Montana is how are standard reference samples obtained? Are these SRS composite samples, or are they collected another way and, if so, please explain to us? Do we have an employee turnover problem in the protein section in FGIS, and how many persons are employed in this protein section? How are protein employees classified in reference to their job duties and responsibilities, and what type of job evaluation is done on their job performance?

I guess we would like to have explained to us the amount and type of training that FGIS protein technicians receive, and do they receive training on a regular timely basis?

I have included in my prepared testimony, and it is for your reference, that we are going to be moving into a malting barley protein program, as well. I think it is very, very important before we get into that, that we think things through very, very carefully. In my prepared testimony are some questions that we would ask. Being a State that produces malt barley, we need answers and guidelines so that we don't have the problems that we are faced with here today with the Spring wheat issue.

In summary, approximately 5 to 7 million bushels of Montana's Hard Red Spring wheat may have been sold with questionable protein levels. Wheat from Montana is known worldwide for its high protein content. Wheat is bought and sold based on its protein level. Protein discounts and premiums range from 1 cent per quarter protein up to 18 cents per quarter protein, depending on the market conditions.

In Montana we have been, with our research programs, with the Wheat Research and Marketing Committee moneys, have always been geared toward producing for protein and produce the quality, and not to try and override that with quantity in bushels, so the Montana farmers and ranchers are very cognizant of the value of protein.

If Montana producers were losing 0.1 percent protein on all its grain sold, that would mean a substantial loss in protein dollars, which I think you heard from Mr. Holt with the Grain Growers. In order for this system to work and in order for producers to be correctly compensated for their protein levels, an accurate and stable system for measuring protein levels must be in place.

It was June 29 of this year that Montana found out that Washington State had not raised their national Hard Red Spring wheat SRS samples by one-tenth on June 15, 1987, as the FGIS had ensured us would happen on a nationwide basis. So now we have a discrepancy out there with regards to different points on what the values are.

We are constantly receiving complaints from the elevator trade that the Montana Grain Standards Bureau's proteins run at a higher level than that on the west coast. In the past, we have put more faith in the system than unsubstantiated complaints by the trade. But a lack of direct area-to-area comparisons seems to put our credibility in question. We require needed information to manage an accurate official statewide protein testing program, and we need timely results for that same purpose. We need direct area-to-area comparisons on a regular basis to ensure uniform national proteins. We need all information from our records to verify the accuracy of our protein program.

As an example, with our contractual agreement with FGIS, we spend an average of $1,300 a month for supervision fee, and I guess we don't feel we are getting our money's worth right now or we wouldn't be sitting back in this situation as we are here today. We feel the problem can be corrected. I guess my final comment is to emphasize that protein—0.1 protein is a very, very important thing to Montana producers and very important in the pocketbook.

We have come off of several tough years of drought in Montana, and the producer ought to get what he is selling and he ought to get the right amount.

Thank you very much.

[The prepared statement of Mr. Kelly follows:]

Joint Hearing

USDA - FGIS - Protein Determination

of Hard Red Spring Wheat

Senate Subcommittee on Agriculture Production

And Stabilization of Prices

House Subcommittee on Wheat, Soybean, and Feed Grain

DATE: NOVEMBER 10, 1987

TIME: 10:00 A.M.

PLACE: ROOM 332, Russell Building
WASHINGTON, D.C.

STATEMENT OF KEITH C. KELLY, DIRECTOR, MONTANA DEPARTMENT OF AGRICULTURE, HELENA, MONTANA

Mr. Chairman, members of the committee, I appreciate this opportunity to discuss what I believe are serious problems as it relates to FGIS's procedures for determining protein in Hard Red Spring Wheat produced in Montana.

A brief background is in order so that you understand our relationship with USDA-FGIS. Every three years, the Montana Department of Agriculture enters into an agreement, which is more commonly referred to as "DESIGNATION AS AN OFFICIAL AGENCY FOR OFFICIAL INSPECTION UNDER THE U.S. GRAIN STANDARDS ACT, AS AMENDED".

The designation allows the Montana Department of Agriculture to perform all functions in accordance with and comply with all requirements of the Act, regulations, and FGIS instructions in effect at the time of the designation.

Our current designation will terminate on August 31, 1990.

During the later part of June, it was brought to my attention of several procedural and technical problems involving FGIS procedures that may have cost spring wheat producers in Montana several millions of dollars.

Today, I wish to bring to light a number of problems that we encounter managing an official statewide protein program.

Failure of FGIS to return information required for accurate program and meaningful records to verify program accuracy.

Failure of FGIS to return needed information in a timely manner. This information is needed in a timely manner to be relevant to present protein conditions.

Lack of comprehensive area-to-area comparisons.

Failure of FGIS to use enough samples for meaningful results.

- o Standard Reference Samples (SRS), (10 HRS and 10 HRW).
- o Direct comparison samples with FGIS and other official agencies (10 HRS and 10 HRW, biweekly basis).

EXAMPLES:

Tested suspected spring and durum wheat SRS samples on Kjeldahl system, results confirmed assigned values were inaccurate.

NOVEMBER 1986 - Began trying to correct known inaccurate spring and durum wheat SRS values. (See attachment #1, 2, and 3.)

NOVEMBER THROUGH APRIL 1987 - Continually requested from Moscow Field Office for assistance with this problem.

MARCH 1987 - Sent SRS with suspected inaccurute assigned values to Kansas City for testing. Received no results from Kansas City. After continually requesting required information from the Moscow Field Office, we were told Kansas City would not give us individual corrected sample values, but our baseline value was close.

We explained that we have requests to examine our protein records on a regular basis from trade and growers and without correct values our records indicate we are running an inaccurate program. (See attachments #1, 2, 3, and 5.)

We were told by Moscow Field Office the reason for not providing revised values was that new national SRS samples would be put into use soon.

Didn't receive national spring SRS samples until mid-April 1987.

APRIL 21, 1987 - LeRoy Baker and Al Williams interpreted book 6, chapter 3, page 3, to mean testing of national spring SRS was to commence on May 4, 1987 and be run concurrently with old spring SRS samples. LeRoy informed us that he was mistaken and testing should have begun on April 13, 1987 and run for 3 weeks prior to May 4.

Asked Moscow for and received permission to test new spring SRS samples on April 29, 30, and May 1, 1987, as our permanent protein technician was on vacation through April 28, 1987. (See attachment #3.)

MAY 4, 1987 - Put new SRS samples into use. Sample #1 and #6 of the spring SRS values don't match NIR results.

AUGUST 13, 1987 - Told by Moscow Field Office to disregard results on spring SRS samples #1 and #6 as they were due to be replaced. Mid-August, received replacement for spring SRS samples #1 and #6. We are still waiting for instructions to put these samples into use. (See attachment #4.)

SEPTEMBER 11, 1987 - Instructed by FGIS to send weekly monitor samples directly to Kansas City. Received spring wheat results one month later. Still haven't received any winter results. (See attachment #6.)

SEPTEMBER 27, 1987 - Performed required maintenance on spring and winter grinders as requested by FGIS. Sent flour samples to FGIS for new moisture values as required. Still have not received new flour bias.

SEPTEMBER 28, 1987 - Instructed by Kansas City to disregard sample #6 and run a 9-sample average. We were also instructed to send spring SRS sample #3 and #6 to them for assigned value check. Still haven't received an answer.

SEPTEMBER 29, 1987 - Finally received durum SRS samples.

QUESTIONS

1. How are Standard Reference Samples (SRS) obtained? Are these SRS composite samples, if so please explain.
2. Do you have an employee turn over problem in the protein section? How many persons are employed in the protein section?
3. How are protein employees classified in reference to their job duties and responsibilities? Are these employees evaluated on their job performance?
4. Please describe the amount and type of training that FGIS protein technicians receive? Do they receive training on a regular basis?

SUMMARY

Approximately 5 to 7 million bushels of Montana's Hard Red Spring Wheat may have been sold with questionable protein levels. Wheat from Montana is known world wide for it's high protein content. Wheat is brought and sold based on it's protein level. Protein discounts and premiums range from 1 cent per 1/4% protein up to 18 cents per 1/4% depending on market conditions. If Montana producers were losing 1 tenth of a percent protein on all grain sold - that means substantial losses in protein dollars. In order for the system to work and in order for producers to be correctly compensated for their protein levels, an accurate and stable system for measuring protein levels must be in place.

June 29, 1987, Montana found out Washington State had not raised their National hard red spring wheat SRS samples by 0.1% on June 15, 1987, as the FGIS had insured us would happen nationwide. We are constantly receiving complaints from the elevator trade that the Montana Grain Standards Bureau's proteins run at a higher level than the west coast. In the past we have put more faith in the FGIS system than unsubstantiated complains from the trade. A lack of direct area-to-area comparisons seems to put our credibility in question. We require needed information to manage an accurate official statewide protein testing program. We need timely results for same purpose. We need direct area-to-area comparisons on a regular basis to insure uniform national proteins. We need all information for our records to verify the accuracy of our protein program. The state of Montana spends an average of $1,300.00/month for supervision fee and we don't feel we are getting our money's worth. We feel this problem can be corrected with a little more self-management from FGIS.

April 29, 1987 (Wen.)

#1

Grain Inspected for Month of 5440 19

14.6
10.2

For

9.3
10.1

13.9
10.8

DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER
	SPr		WTr		DNS		
1	12.5 +.1 10. +.6		13.1 +.1 9.9 +.3		11.6 +. 9.0	0	
2	13.6 0 10.1		13.2 +.1 9.5 -.2	2	12.5 +.1 9.7	0	
3	14.2 9.3 0	3	13.3 +.1 9.3 +.1	3	13.1 -.1 9.8	-.1	
4	15.0 +.4 9.3 0	4	14.8 0 9.2 0	4	13.8 +.1 10.2	0	
5	14.0 9.9 -.2	5	15.0 +.2 8.9 -.3	5	14.3 +.3 8.3	-.1	
6	15.3 0 9.9 -.1	6	15.1 0 9.3 -.3	6	14.5 9.9	-.1	
7	15.6 -.1 9.6 +.1	7	15.0 0 9.3 -.1	7	14.8 0 9.6	-.1	
8	15.7 +.2 9.3 0	8	15.2 0 9.1 -.2	8	15.4 +.1 8.8	-.1	
9	15.7 9.1 -.3	9	15.8 +.2 8.7 -.4	9	16.0 8.1	-.3	
10	17. +.6 9.0 0	10	16.4 -.1 8.6 -.2	10	17.5 +.4 8.7	-.2	
	15.03 9.60		[illegible].63 9.30		14.40 9.31		
	15.01 9.59		14.69 9.18		14.35 9.21		
	-.02 -.01		+.06 -.12		-.05 -.10		

New Bulks

	SPr		Wtr		Spr 12%	Wtr 12%
1	11.3 +.1 10.0 +.7	1	11.2 +.3 10.0 +.7	1	11.05 -.14	10.95 +.0
2	13.4 +.4 8.7 +.2	2	13.5 +.7 8.7 +.2	2	12.92 -.07	13.01 +.2
3	13.8 +.2 9.1 +.3	3	14.0 +.5 9.2 +.4	3	13.36 -.25	13.57 +.0
4	14.3 +.3 10.1 +.5	4	14.1 +.2 10.0 +.4	4	14.00 -.01	13.79 +.0
5	16.3 +.7 8.4 +.1	5	16.7 +.1 8.9 +.1	5	15.66 +.07	16.04 +.4
6	9.3 +.1 10.9 +.3	6	12.1 +.1 11.1 +.5	6	12.15 -.02	11.98 -.0
7	13.7 +.2 10.2 +.2	7	13.7 +.3 10.4 +.4	7	13.43 -.08	13.46 +.0
8	14.6 +.4 8.8 0	8	14.9 +.7 8.8 +.2	8	14.09 -.15	14.38 +.2
9	15.4 +.2 9.0 +.1	9	15.7 +.5 8.9 0	9	15.06 -.15	15.17 +.0
10	16.6 +.3 9.9 +.2	10	16.1 -.1 9.8 +.1	10	16.21 -.13	15.71 -.6
	13.79 9.23		13.75 9.23		13.89 Feds	13.75
	14.17 9.51		14.20 9.53		13.79	13.81
	+.[illegible] +.[illegible]		+.45 +.30		-.10	+.06

April 29, 1987 (Wen.)

Grain Inspected for Month of 5440 19

14.6
10.2 For 9.3 / 10.1 13.9 / 10.8

DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER
	Spr		Wtr		DUR		
1	12.5 +.1 10.4 +.6	1	13.1 +.1 9.9 +.3	1	11.6 +.3 9.0	0	
2	13.6 0 10.1 -.2	2	13.2 +.1 9.5 -.2	2	12.5 +.1 9.7	0	
3	14.2 0 9.3 0	3	13.3 +.1 9.3 +.1	3	13.1 -.1 9.8	-.1	
4	15.0 +.4 9.3 0	4	14.8 0 9.2 0	4	13.8 +.1 10.2	0	
5	14.9 +.1 9.9 -.2	5	15.0 +.2 8.9 -.3	5	14.3 +.3 8.3	-.1	
6	15.3 0 9.9 -.2	6	15.1 0 9.3 -.3	6	14.5 -.2 9.9	-.1	
7	15.6 -.1 9.6 +.1	7	15.0 0 9.3 -.1	7	14.8 0 9.6	-.1	
8	15.7 +.2 9.3 0	8	15.2 0 9.1 -.2	8	15.4 +.1 8.8	-.1	
9	15.7 -.2 9.1 -.3	9	15.8 +.2 8.7 -.4	9	16.0 -.1 8.1	-.3	
10	17.6 -.6 9.0 0	10	16.4 -.1 8.6 -.2	10	17.5 -.4 8.7	-.2	
	15.03 9.60		14.63 9.30		14.40 9.31		
	15.01 9.59		14.69 9.18		14.35 9.21		
	-.02 -.01		+.06 -.12		-.05 -.10		

New Bulks

DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER
	Spr		Wtr		Spr 12%		Wtr 12%
1	11.3 +.1 10.0 +.7	1	11.2 +.3 10.0 +.7	1	11.05 -.14		10.95 +.03
2	13.4 +.4 8.7 +.2	2	13.5 +.7 8.7 +.2	2	12.92 -.07		13.01 +.26
3	13.8 +.2 9.1 +.5	3	14.0 +.5 9.2 +.4	3	13.36 -.25		13.57 +.07
4	14.3 +.3 10.1 +.5	4	14.1 +.2 10.0 +.4	4	14.00 -.01		13.79 +.06
5	16.3 +.7 8.4 +.1	5	16.7 +.1 8.9 +.1	5	15.66 +.07		16.04 +.49
6	12.3 +.1 10.9 +.3	6	12.1 +.1 11.1 +.5	6	12.15 -.02		11.98 -.02
7	13.7 +.2 10.2 +.2	7	13.7 +.3 10.4 +.4	7	13.43 -.08		13.46 +.09
8	14.6 +.4 8.8 0	8	14.9 +.7 8.8 +.2	8	14.09 -.15		14.38 +.23
9	15.4 +.2 9.0 +.1	9	15.7 +.5 8.9 0	9	15.06 -.15		15.17 +.01
10	16.6 +.3 9.9 +.4	10	16.1 -.1 9.8 +.1	10	16.21 -.13		15.71 -.53
	13.79 9.23		13.75 9.23		13.89	Ksd.	13.75
	14.17 9.51		14.20 9.53		13.79		13.81
	+.28 +.28		+.45 +.30		-.10		+.06

April 30, 1987 (Thurs.)

Grain Inspected for Month of 5542 19

14.6 For 9.5 13.9

10.2 10.1 10.8

DATE	CAR NUMBER Spr	DATE	CAR NUMBER Wtr	DATE	CAR NUMBER Dtr	DATE	CAR NUMBER
1	12.6 +.2 10. +.6		13.0 0 9.9 +.3		11.6 +.3 9.0 0		
2	13.8 +.2 10.1 -.2	2	13.2 +.1 9.5 -.2	2	12.4 0 9.6 -.1		
3	14.2 9.3 0	3	13.2 0 9.3 +.1	3	13.1 -.1 9.7 -.2		
4	14.9 +.3 9.3 0	4	14.6 -.2 9.2 0	4	13.8 +.1 10.2 0		
5	14.8 0 9.9 -.2	5	15.0 +.2 9.0 -.2	5	14.2 +.2 8.3 +.1		
6	15.3 0 9.9 -.2	6	15.1 0 9.4 -.2	6	14.5 -.2 9.9 -.1		
7	15.5 -.2 9.6 +.1	7	14.7 -.3 9.3 -.1	7	14.9 +.1 9.6 -.1		
8	15.6 +.1 9.3 0	8	15.0 -.2 9.2 .1	8	15.3 0 8.8 -.1		
9	15.8 9.1 -.3	9	15.4 -.2 8.7 -.4		16.1 0 8.9 -.2		
10	17.6 -.6 8.9 -.1	10	16.6 +.1 8.6 -.2		17.4 -.5 8.8 -.1		
	15.03 9.60		14.63 9.30		14.40 9.31		
	15.01 9.58		14.58 9.21		14.33 9.21		
	-.02 -.02		-.05 -.09		-.07 -.10		

New Bulks

	Spr			Wtr		Spr. 12%		Wtr 12%	
1	11.2	10.0	1	11.0	10.1	10.95	-.24	10.77	-.1
2	13.3	8.9	2	13.1	8.9	12.85	-.14	12.65	-.1
3	13.8	9.2	3	14.1	9.2	13.37	-.24	13.67	+.1
4	14.3	10.2	4	14.5	10.2	14.01	.0	14.21	+.3
5	16.2	8.7	5	16.5	8.5	15.61	+.02	15.87	+.3
6	12.4	10.9	6	12.2	11.1	12.24	+.07	12.08	+.0
7	13.7	10.4	7	13.7	10.4	13.46	-.05	13.46	+.0
8	14.7	8.9	8	14.8	9.6	14.20	-.04	14.31	+.1
9	15.8	9.2	9	15.8	9.1	15.31	+.10	15.30	+.1
10	16.4	10.0	10	16.6	9.9	16.04	-.30	16.21	-.0
	14.18	9.23		14.23	9.23	13.89	Freda	13.75	
		9.64			9.64	13.80		13.85	
		+.41			+.41	-.09		+.10	

~~April~~ May 1, 1987 (Fri)

Grain Inspected for Month of 5576 19

14.6 For 9.3 14.0
10.2 10.1 10.3

DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER	DATE	CAR NUMBER
	Spr		Wtr		Dur		
1	12.5 +.1 10.4 +.4	1	13.0 0 9.9 +.3	1	11.4 +.1 9.1 +.1		
2	13.6 0 10.1 -.2	2	13.2 +.1 9.5 -.2	2	12.4 0 9.7 0		
3	14.1 9.3 0	3	13.3 +.1 9.3 +.1	3	13.1 -.1 9.8 -.1		
4	15. +.4 9.3 0	4	14.8 0 9.2 0	4	13.8 +.1 10.3 0		
5	14.9 +.1 9.9 -.2	5	14.8 0 9.0 -.2	5	14.1 +.1 8.4 0		
6	15.2 -.1 9.9 -.2	6	15.6 +.1 9.4 -.2	6	14.5 -.2 9.9 -.1		
7	15.5 -.2 9.5 0	7	14.9 -.1 9.3 -.1	7	14.9 +.1 9.6 -.1		
8	15.5 0 9.4 +.1	8	15.3 +.1 9.1 -.2	8	15.3 0 8.8 -.1		
9	15.7 9.1 -.3	9	15.5 -.1 8.8 -.3	9	16.0 8.7 -.2		
10	17.2 .3 9.9 -.1	10	16.7 +.2 8.6 -.2		17. -.4 8.8 -.1		
	15.03 F. 9.60		14.63 F. 9.30		14.40 F. 9.31		
	14.97 9.58		14.65 9.21		14.30 9.25		
	-.06 -.02		+.02 -.09		-.10 -.06		

Moisture Wtr
Wen. 9.53 Thurs. 9.64 Fri 9.53
Fred. 9.23
average 9.57
+.34

NEW BOOKS

Moisture Spr
Wen .851 thurs 9.64 Fri 9.64
Fred 9.23
average 9.60
+.37

	Spr		Wtr
1	11.03 -.14 10.0 +.7	1	10.91 -.01 10.1 +.8
2	12.98 -.01 8.9 +.4	2	12.77 +.04 8.9 +.4
3	13.43 -.18 9.3 +.5	3	13.60 +.10 9.2 +.4
4	13.95 -.04 10.1 +.5	4	14.09 +.20 10.2 +.6
5	15.36 -.23 8.7 +.4	5	15.84 +.29 8.6 +.3
6	12.14 -.07 11.1 +.5	6	12.08 +.09 11.0 +.4
7	13.45 -.04 10.4 +.4	7	13.50 +.17 10.4 +.4
8	14.09 -.15 8.9 +.1	8	14.17 +.02 8.9 +.1
9	15.17 -.04 11.1 +.2	9	15.3 +.18 11.0 +.1
10	16.13 -.2 9.9 +.2	10	16.44 +.2 10.0 +.3
	13.89 F. 9.23		13.75 F. 9.23
	13.77 9.64		13.87 9.63
	-.12 +.41		+.12 +.40

Pro. Wtr.
Wen 13.81 Thru. 13.85 Fri 13.87
Fred - 13.75
average - 13.84
+.09

Pro. Spr.
Wen. 13.79 Thru 13.80 Fri. 13.77
Freda 13.89
average 13.79
-.10

c. The new reference sampled may be used and the old reference samples discarded if a bias adjustment is not indicated for the new sample set during the 3-week testing period. Contact the protein coordinator and QCB for assistance if the new reference samples indicate a bias correction is required. Continue to use the old reference samples for bias checks until the reason for the discrepancy can be determined.

E. Storage of Reference Samples. Reference samples shall be stored at room temperature in plastic containers with screw tops or securely fastened lids and placed away from vents, heating devices, and direct sunlight. Mothballs sealed in plastic bags will be placed in the samples by QCB. The mothballs must remain in the samples to prevent insect infestation. Discard and replace reference samples if they become infested.

Protect reference samples from manipulation by unauthorized persons to maintain sample security.

F. Using Reference Samples. Reference samples must be analyzed for each class of wheat to be officially tested by the technician. Reference samples shall be used in the following way to evaluate instrument accuracy prior to official protein testing or when instrument accuracy is questioned.

1. The same technician that analyzes official samples must analyze the reference samples to prevent operator bias from giving erroneous results. The NIR instrument must be biased to the same technician that grinds the samples and to the same technician that fills the sample cups if more than one technician performs these procedures.

2. Technicians will grind reference samples once each week and retain the ground samples for subsequent checks during the week. **Reference samples must be ground and the ground flour analyzed according to the procedures in sections 4.2 and 4.3.** The ground reference samples murt be stored at room temperature in sample jars with moisture-proof caps and properly identified. Subsequent performance checks during the week will be conducted on the ground portions at room temperature, mainly to verify that the instrument has not malfunctioned. The technician should expect to see a decline in protein value on the cold flour. **Do not bias the instrument using cold flour samples.**

#2

INSTALAB BIAS ADJUSTMENT WORKSHEET DICKEY-john

Date Aug. 31, 1987 Instalab Serial No. 059211198

Product Grinder Serial No.

	PRODUCT H.R.S.		PRODUCT H.R.W.		PRODUCT DURUM		PRODUCT WHITE	
SAMPLE NO. (N)	MOISTURE ANALYSIS (%) 1.1	PROTEIN ANALYSIS (%) 1.2	MOISTURE ANALYSIS (%) 2.1	PROTEIN ANALYSIS (%) 2.2	MOISTURE ANALYSIS (%) 3.1	PROTEIN ANALYSIS (%) 3.2	MOISTURE ANALYSIS (%) 4.1	PROTEIN ANALYSIS (%) 4.2
1	8.8+.1	10.6-.5	8.8+.1	10.7-.2	8.8-.2	11.1-.2		
2	7.7-.2	13.0+.1	7.7-.2	12.9+.1	9.6-.1	12.4 0		
3	8.4 0	13.3-.2	8.3-.1	13.2-.3	9.7-.2	13.0-.2		
4	9.4+.2	14.1+.2	9.3+.1	13.9 0	10.1-.1	14.4+.1		
5	7.8-.2	15.4-.1	7.8-.2	15.2-.4	8.4 0	14.[illegible]		
6	10.7-.1	12.2+.1	10.7-.1	12.1+.1	9.9-.1	14.7 0		
7	10.0+.1	13.6+.2	10.0+.1	13.5+.1	9.6-.1	14.7-.1		
8	8.3-.1	14.4+.3	8.3-.1	14.2 0	8.9 0	15.[illegible]-.3		
9	8.5-.3	15.1 0	8.5-.3	15.0-.2	8.4 0	16.1 0		
10	9.6-.2	16.1-.1	9.7-.1	16.1-.1	8.9 0	17.8-.1		
2Nd.	TEST LOG							
L0	59.62							
L1	138.01							
L2	125.56							
L3	117.24							
L4	121.51							
L5	48.55							
SUM	Temp. 71°							
AVERAGE (Sum ÷ N)								

STANDARD AVERAGE	8.99	13.79	8.99	13.75	9.31	14.40		
MINUS INSTALAB AVERAGE	8.92	13.78	8.91	13.68	9.23	14.34		
EQUALS BIAS CHANGE REQD	-.07	-.01	-.08	-.07	-.08	-.06		

#3

United States
Department of
Agriculture

Federal Grain
Inspection
Service

USDA-FGIS Technical Center-ST
Quality Control Branch
P. O. Box 20285
Kansas City, MO 64195

April 8, 1987

TO: All Field Offices and Specified Service Points Analyzing HRW and HRS Wheat for Protein

FROM: C. A. Watson, Branch Chief
Quality Control Branch C. A. Watson

SUBJECT: National Reference Samples

Five HRW and five HRS wheat samples are being sent to you under separate cover. These samples are the National Reference Samples (RS) for HRW and HRS wheat. All specified service points shall commence using these samples effective May 4, 1987.

The protein and moisture values shown below were established by the Quality Control Branch. These values shall be used to bias the NIR instruments for HRW and HRS wheat, respectively. The instructions for biasing are found in the Grain Inspection Handbook, Book V, Chapter 3, pp. 3-1 to 33-4 (copy enclosed). Contrary to p. 3-1, para. B.2., the moisture baseline value provided below shall be used.

Sample No.	NIR Protein % (12% mb)		Moisture %
	HRW	HRS	
1	10.92	11.19	9.30
2	12.75	12.99	8.45
3	13.50	13.61	8.84
4	13.85	14.01	9.56
5	15.55	15.59	8.27
6	12.00	12.17	10.56
7	13.37	13.51	10.01
8	14.15	14.24	8.75
9	15.16	15.21	8.85
10	16.24	16.34	9.74
Baseline(Avg.)	13.75	13.89	9.23

cc: Jackson
Marshall

The Federal Grain Inspection Service

#4

INSTALAB BIAS ADJUSTMENT WORKSHEET DICKEY-john

Date Aug. 13, 1987 Instalab Serial No. 059211198

Product d Grinder Serial No.

	PRODUCT H.R.S.		PRODUCT H.R.W.		PRODUCT DURUM		PRODUCT WHITE	
SAMPLE NO. (N)	MOISTURE ANALYSIS (%) 1.1	PROTEIN ANALYSIS (%) 1.2	MOISTURE ANALYSIS (%) 2.1	PROTEIN. ANALYSIS (%) 2.2	MOISTURE ANALYSIS (%) 3.1	PROTEIN: ANALYSIS (%) 3.2	MOISTURE ANALYSIS (%) 4.1	PROTEIN ANALYSIS (%) 4.2
1	9.0+.3	10.2-.3	9.0+.3	10.9 0	9.0 0	11.0-.3		
2	8.0+.1	12.9 0	8.0+.1	12.7-.1	9.7 0	12.4 0		
3	8.5+.1	13.4-.1	8.5+.1	13.2-.2	9.7-.2	13.1-.1		
4	9.4+.2	14.7+.4	9.0+.2	14.6+.2	10.2 0	14.2+.5		
5	8.0 0	15.7+.2	8.0 0	15.4-.2	8.5+.1	14.0 0		
6	10.5-.3	12.4+.3	10.5-.3	12.5+.5	9.9-.1	14.8+.1		
7	10.0+.1	13.4+.1	9.9 0	13.5+.1	9.7 0	14.8 0		
8	8.4 0	14.2+.1	8.4 0	14.7 0	8.9 0	15.5+.2		
9	8.6-.2	15.7+.2	8.6-.2	15.4+.1	8.5+.1	16.2+.1		
10	9.6-.2	16.4+.1	9.6-.3	16.2 0	9.0-.1	17.7-.2		
	TEST LOG	TEST LOG						
LO	59.27	59.28						
L1	137.47	137.47						
L2	124.79	124.78						
L3	116.76	116.77						
L4	120.80	120.82						
L5	47.94	47.96						
SUM	Temp 69°							
AVERAGE (Sum ÷ N)								

Sample No. 5 Spr. wheat has durum wht and barley. Moscow informed as it will be replaced because of inaccurate values

	H.R.S. moisture	H.R.S. protein	H.R.W. moisture	H.R.W. protein	DURUM moisture	DURUM protein	WHITE moisture	WHITE protein
STANDARD AVERAGE	8.99	13.79	8.99	13.75	9.31	14.40		
MINUS INSTALAB AVERAGE	9.00	13.84	8.99	13.81	9.31	14.37		
EQUALS BIAS CHANGE REQD.	+.01	+.05	0	+.06	0	-.03		

INSTALAB BIAS ADJUSTMENT WORKSHEET DICKEY-john

Date Aug. 19, 1987 Instalab Serial No. 0592 11198

Product Grinder Serial No.

	PRODUCT H.R.S.		PRODUCT H.R.W.		PRODUCT DURUM		PRODUCT WHITE	
SAMPLE NO. (N)	MOISTURE ANALYSIS (%) 1.1	PROTEIN ANALYSIS (%) 1.2	MOISTURE ANALYSIS (%) 2.1	PROTEIN ANALYSIS (%) 2.2	MOISTURE ANALYSIS (%) 3.1	PROTEIN ANALYSIS (%) 3.2	MOISTURE ANALYSIS (%) 4.1	PROTEIN ANALYSIS (%) 4.2
1	9,1+,4	10,6-,5	9,1+,4	10,8-,1	9,0 0	11,0-,3		
2	7,9 0	12,8 ,1	7,9 0	12,8 0	9,7 0	12,6+,2		
3	8,5+,1	13,2-,3	8,5+,1	13,2-,3	9,8-,1	13,2 0		
4	9,4+,2	14,2+,3	9,4+,2	14,4+,2	10,3+,1	13,9+,2		
5	7,9-,1	15,4-,1	8,0 0	15,2-,4	8,5+,1	13,2-,1		
6	10,7-,1	12,7+,2	10,7-,1	12,4+,4	10,0 0	14,6-,1		
7	10,0+,1	13,3-,1	10,0+,1	13,4 0	9,8+,1	15,0+,2		
8	8,5+,1	14,2+,1	8,4 0	14,2 0	9,0+,1	15,4+,1		
9	8,6-,2	14,9-,2	8,6-,2	15,0-,2	8,5+,1	16,1 0		
10	9,6-,2	16,3+,1	9,7-,1	16,3+,1	9,1+,2	17,9 0		
2nd.	TEST LOG							
L0	59,73							
L1	138,06							
L2	125,45							
L3	117.29							
L4	121.28							
L5	48,46							
SUM	Temp. 67°							
AVERAGE (Sum ÷ N)								

Moisture — samples #1 & 6 will be replaced because of inaccurate values

	1.1	1.2	2.1	2.2	3.1	3.2	4.1	4.2
STANDARD AVERAGE	8,99	13,79	8,99	13,75	9.31	14.40		
MINUS INSTALAB AVERAGE	9,02	13.72	9,03	13.74	9.37	14.36		
EQUALS BIAS CHANGE REQD.	+,03	-.07	+,04	-.01	+,06	-,04		

INSTALAB BIAS ADJUSTMENT WORKSHEET DICKEY-john

Date Sept. 28 Instalab Serial No. 0592 11198

Product ____ Grinder Serial No. ____

	PRODUCT H. R. S.		PRODUCT H. R. W.		PRODUCT DURUM		PRODUCT WHITE	
SAMPLE NO. (N)	MOISTURE ANALYSIS (%) 1.1	PROTEIN ANALYSIS (%) 1.2	MOISTURE ANALYSIS (%) 2.1	PROTEIN ANALYSIS (%) 2.2	MOISTURE ANALYSIS (%) 3.1	PROTEIN ANALYSIS (%) 3.2	MOISTURE ANALYSIS (%) 4.1	PROTEIN ANALYSIS (%) 4.2
1	9.1 +.4	13.9 -.2	9.1 +.4	13.9 0	9.0 0	11.0 -.3		
2	8.0 +.1	12.8 -.1	8.0 +.1	12.7 -.1	9.7 0	13.4 0		
3	8.6 +.2	13.1 -.4	8.6 +.2	13.7 -.3	9.7 -.2	12.8 -.4		
4	9.4 +.2	14.0 +.1	9.4 +.2	13.9 0	10.2 0	14.0 +.3		
5	7.9 -.1	15.1 -.4	7.9 -.1	14.9 -.7	8.4 0	14.0 0		
6	10.5 -.3	[illegible] +.3	10.5 -.3	[illegible] .4	10.0 0	14.9 +.2		
7	9.9 0	13.4 0	9.9 0	13.4 0	9.7 0	14.9 +.1		
8	8.4 0	14.1 0	8.4 0	14.1 -.1	8.9 0	15.3 0		
9	8.5 -.3	15.0 -.1	8.5 -.3	15.0 -.2	8.4 0	16.1 0		
10	9.6 -.2	16.3 +.1	9.6 -.2	16.2 0	9.0 +.1	17.5 .4		
			S	W	10	17.6		
2ND.	TEST LOG		⑤ = 15.1 -.4	14.9 -.7	10	17.8		
L0	58.09							
L1	136.57							
L2	124.09							
L3	115.92							
L4	120.26							
L5	47.73							
SUM	TEMP 63°							
AVERAGE (Sum ÷ N)	HUM. 43							

[illegible] second sample #5 by KC

Now 9 sample average

	H. R. S. Moisture	H. R. S. Protein	H. R. W. Moisture	H. R. W. Protein	DURUM Moisture	DURUM Protein	WHITE Moisture	WHITE Protein
STANDARD AVERAGE	8.99	13.79	8.99	13.75	9.31	14.40		
MINUS INSTALAB AVERAGE	8.99	13.71	8.99	13.67	9.30	14.29		
EQUALS BIAS CHANGE REQD.	0	-.08	0	-.08	-.01	-.11		

#5

INSTALAB BIAS ADJUSTMENT WORKSHEET DICKEY-john

Date Nov. 21, 1987 Instalab Serial No. 25921198

Product ______ Grinder Serial No. ______

	PRODUCT H.R.S.		PRODUCT H.R.W.		PRODUCT DURUM		PRODUCT WHITE	
SAMPLE NO. (N)	MOISTURE ANALYSIS (%) L1	PROTEIN ANALYSIS (%) L2	MOISTURE ANALYSIS (%) 21	PROTEIN. ANALYSIS (%) 22	MOISTURE ANALYSIS (%) 31	PROTEIN: ANALYSIS (%) 32	MOISTURE ANALYSIS (%) 41	PROTEIN ANALYSIS (%) 42
1	9.2+.5	12.6-.5	9.2+.5	12.8-.1	11.6+.2	12.1 0		
2	8.0+.1	12.7-.2	8.0+.1	12.7-.1	12.2 0	15.4-.1		
3	8.6+.2	13.[illegible]-.4	8.6+.2	13.[illegible].3	9.9+.1	13.7+.2		
4	9.6+.4	14.0-.1	9.6+.4	13.8-.1	10.0 0	14.3+.1		
5	7.9-.1	15.7-.2	7.9-.1	15.7-.3	9.6 0	16.7+.2		
6	12.7-.1	12.4+.3	12.7-.1	12.4+.5				
7	10.0+.1	13.7-.1	12.0+.1	13.5+.1				
8	8.4 0	14.1 0	8.3-.1	14.7 0				
9	8.5-.3	15.1 0	8.5-.3	15.1-.1				
10	9.6-.2	16.2 0	9.6-.2	16.2 0				
2 Nd.	TEST LOG		HRS ⑨	HRW ⑤				
L0	59.10		13.58	13.56				
L1	137.74		13.50	13.56				
L2	125.25		-.08	0				
L3	117.08							
L4	121.74							
L5	49.55							
SUM	TEMP. 72°							
AVERAGE (Sum ÷ N)	HUM. 35							

	H.R.S. Moisture	H.R.S. Protein	H.R.W. Moisture	H.R.W. Protein	DURUM Moisture	DURUM Protein	WHITE Moisture	WHITE Protein
STANDARD AVERAGE	8.99	13.79	8.99	13.75	10.19	14.36		
MINUS INSTALAB AVERAGE	9.05	13.68	9.04	13.73	10.26	14.44		
EQUALS BIAS CHANGE REQD.	+.06	-.11	+.05	-.02	+.07	+.08		

CALIBRATION RECORD—INSTALAB DICKEY-john

#5

Product Number 1

Product Name H.R.S.

Date: Aug. 5, 1987

bias information stating Aug. 5

FGIS Set up VALUES — CURRENT

MOISTURE		PROTEIN		MOISTURE		PROTEIN	
F	~~1.1+(5.1)~~	F	~~1.2+(5.2)~~	F		F	
U	~~14.0~~	U	~~17.0~~	U	14.0	U	17.0
L	~~7.0~~	L	~~9.0~~	L	7.0	L	9.0
KA	~~7.30~~	KA	~~21.70~~	KA	7.30	KA	21.70
K0	~~0~~	K0	~~0~~	K0	0	K0	0
K1	~~0~~	K1	~~0~~	K1	0	K1	0
K2	~~−.0828~~	K2	~~+1.1717~~	K2	−.0828	K2	+1.0234
K3	~~−.1041~~	K3	~~−1.0106~~	K3	−.1041	K3	−.8827
K4	~~+.1880~~	K4	~~0~~	K4	+.1880	K4	0
K5	~~0~~	K5	~~−.2140~~	K5	0	K5	−.1869

BIAS ADJUSTMENT RECORD

MOISTURE			PROTEIN			MOISTURE			PROTEIN		
DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA
8/5	—	7.30	8/5	—	21.70						
8/10	+.25	7.55	8/18	−.10	21.60						
8/24	−.15	7.40	8/24	+.10	21.70						
9/8	+.20	7.60	9/25	−.05	21.65						
9/14	−.15	7.45	9/27	−.10	21.55						
9/26	+.30	7.75	10/13	−.05	21.50						
9/27	−.05	7.70	10/16	−.05	21.45						
10/20	−.10	7.60									

CALIBRATION RECORD—INSTALAB DICKEY-john

Product Number 2

Product Name H.R.W.

Date: Aug. 5, 1987

MOISTURE		PROTEIN		MOISTURE		PROTEIN	
EGIS. SET UP VALUES				CURRENT			
F	~~7.1+(6.1)~~	F	~~7.24(6.2)~~	F		F	
U	~~14.0~~	U	~~17.0~~	U	14.0	U	17.0
L	~~7.0~~	L	~~9.0~~	L	7.0	L	9.0
KA	~~7.16~~	KA	~~18.90~~	KA	7.16	KA	18.90
K0	~~0~~	K0	~~0~~	K0	0	K0	0
K1	~~0~~	K1	~~0~~	K1	0	K1	0
K2	~~−.0743~~	K2	~~+1.2125~~	K2	−.0743	K2	+1.0217
K3	~~−.1104~~	K3	~~−.9956~~	K3	−.1104	K3	−.8390
K4	~~+.1876~~	K4	~~0~~	K4	+.1876	K4	0
K5	~~0~~	K5	~~−.2914~~	K5	0	K5	−.2456

BIAS ADJUSTMENT RECORD

MOISTURE			PROTEIN			MOISTURE			PROTEIN		
DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA
8/5	—	7.16	8/5	—	18.90						
8/10	+.24	7.40	8/17	+.09	18.99						
8/24	−.15	7.25	8/18	−.12	18.89						
9/8	+.20	7.45	9/27	−.04	18.85						
9/14	−.15	7.30	10/16	−.05	18.80						
9/26	+.30	7.60									
9/27	−.05	7.55									
10/26	−.10	7.45									

CALIBRATION RECORD—INSTALAB DICKEY-john

Product Number 3

Product Name Durum

Date: Aug. 5, 1987

MOISTURE EGIS. Set up Values		PROTEIN		MOISTURE		PROTEIN	
F	3.1+(7.1)	F	3.2+(7.2)	F		F	
U	14.0	U	17.0	U		U	
L	7.0	L	11.0	L		L	
KA	8.60	KA	18.40	KA		KA	
K0	0	K0	0	K0		K0	
K1	0	K1	0	K1		K1	
K2	−.0485	K2	+1.0879	K2		K2	
K3	−.1176	K3	−.9314	K3		K3	
K4	+.1687	K4	0	K4		K4	
K5	0	K5	−.1647	K5		K5	

BIAS ADJUSTMENT RECORD

MOISTURE			PROTEIN			MOISTURE			PROTEIN		
DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA	DATE	CHANGE	NEW KA
8/5	—	8.60	8/5	—	18.40						
8/10	−.10	8.40	8/24	−.10	18.30						
8/24	−.10	8.30	8/27	+.05	18.35 MG						
8/27	+.10	8.40	9/24	+.20	18.55						
9/27	−.10	8.30	10/10	−.10	18.45						
10/1	+.05	8.35 MG									
10/24	−.10	8.25									

#6

OFFICIALLY SAMPLED PROTEIN COMPARISON

ORIGIN- MONTANA, DATE SAMPLED- SEPTEMBER 24,1987
MONTANA STATE GRAIN STANDARDS BUREAU

DESTINATION- VANCOUVER, DATE SAMPLED- OCTOBER 15, 1987
WASHINGTON STATE, VANCOUVER OFFICE

CAR NUMBER	MT	WA	DIFF	CAR NUMBER	MT	WA	DIFF
TILX 510161	14.4	14.2	-0.2	GNWR 810304	14.2	14.1	-0.1
USLX 18230	14.4	14.3	-0.1	SLSF 86799	14.3	14.2	-0.1
BN 458343	14.3	14.3	0	PTLX 15639	14.1	14.0	-0.1
SLSF 79602	14.3	14.2	-0.1	CAGX 461	14.4	14.1	-0.3
BN 458329	14.3	14.3	0	BN 454416	14.4	14.3	-0.1
TRNX 500041	14.5	14.6	+0.1	BN 461577	14.6	14.4	-0.2
SLSF 79894	14.4	14.3	-0.1	GTAX 20185	14.2	14.3	+0.1
BN 456425	14.4	14.0	-0.4	USLX 26693	14.4	14.3	-0.1
TLDX 5880	14.4	14.1	-0.3	PTLX 34787	14.1	14.1	0
BN 447846	14.4	14.2	-0.2	SCOX 1503	14.4	14.2	-0.2
BN 455642	14.3	14.1	-0.2	RUSX 800448	14.5	14.4	-0.1
SLSF 86771	14.4	14.5	+0.1	BN 460786	14.2	14.2	0
BN 447252	14.4	14.3	-0.1	RUSX 5315	14.0	13.8	-0.2
GN 171909	13.9	14.1	+0.2	CBQ 184722	14.7	14.2	-0.5
PLCX 21087	14.5	14.4	-0.1	WSO 119405	14.4	14.3	-0.1
BN 449048	14.4	14.1	-0.3	USLX 27305	14.4	14.2	-0.2
NAHX 46259	14.4	14.3	-0.1	GTAX 20181	14.1	14.2	+0.1
BN 453401	14.2	14.0	-0.2	BN 449179	14.3	14.0	-0.3
PLCX 19508	14.3	14.2	-0.1	BN 460608	14.1	14.0	-0.1
CAGX 124	14.0	14.3	+0.3	CGCX 20542	14.1	14.1	0
CGCX 20423	14.1	14.3	+0.2	CAGX 785	14.1	14.1	0
BN 456091	14.0	14.2	+0.2	BN 453970	14.3	14.2	-0.1
BN 458519	14.2	14.2	0	CGCX 20478	14.3	14.2	-0.1
TILX 510374	14.5	14.3	-0.2	WSOR 10067	14.2	14.2	0
BN 446585	14.7	14.7	0	USLX 18335	14.2	14.1	-0.1
PTLX 34629	14.4	14.2	-0.2	C&S 458952	14.3	14.1	-0.2

MONTANA STATE:	52 CAR AVERAGE	14.30
WASHINGTON STATE:	52 CAR AVERAGE	14.21
DIFFERENCE:		-0.09

#7

3. Determine the reference sample values by:

a. Using a scoop, dip approximately 20 grams of wheat from each reference sample after mixing the sample by passing it through a Boerner divider once or by pouring the sample back and forth five times using sample pans. Do not allow any of the samples to become contaminated by wheat from another sample or by other foreign material. If a sample becomes contaminated, discard the sample and obtain a replacement.

b. Grind and analyze the samples according to official procedures.

c. Record the NIR moisture and 12 percent moisture basis protein on a reference sample check log or worksheet. A record must be maintained for all bias checks and adjustments. A separate log or worksheet must be completed for each wheat class tested. The information regarding this check must include the location, instrument model and serial number, date of check, technician's name performing the check, wheat class being checked, date of grind, the NIR moisture and 12 percent moisture basis protein for each sample during the check and the average of these results. Also include the QCB baseline values, the difference between the reference sample check and baseline values, and any other unusual conditions noted during the check. An example of a log is given in the exhibit. Testing locations may use this exhibit or develop a log or worksheet to best suit their needs.

4. Evaluate the reference sample values by comparing the corrected protein results to the baseline values. Individual and average reference sample values are used in determining instrument accuracy.

Official protein testing shall be suspended when using a fresh ground sample if:

a. The average reference sample corrected protein value differs from the baseline protein value by **more than 0.15 percent**, or

b. Any individual reference sample corrected protein value differs from the individual sample baseline protein value by **more than 0.40 percent**, or

c. Most of the individual reference sample corrected protein values (i.e., 4 out of 5 or 8 out of 10) during a check are to one side of the individual sample baseline protein values by **0.15 percent or more**.

United States
Department of
Agriculture

Federal Grain
Inspection
Service

P.O. Box 9346
Moscow, Idaho 83843-0117

#8

TO: Chief Inspectors

FROM: LeRoy Baker, Protein Coordinator
Moscow Field Office

THRU: Larry Zehm, Field Office Manager
Moscow Field Office

DATE: September 8, 1987

SUBJECT: New Protein Program

Please note the attached letter from FGIS headquarters regarding a new program for direct monitoring of official proteins by QCTB, effective immediately. Until further notice, this program will apply to hard red winter wheat (HRW) and hard red spring wheat (HRS) only, and the first sets of samples are to be mailed out by September 11, 1987. The old monitoring program, established by the Moscow Field Office, will remain in effect for durum and white wheat for now.

As a further clarification, each inspection agency is to select five (5) HRW and five (5) HRS samples from those ran each week, remove the dockage from 120 grams of each one, cut them in half and send one-half (60 grams) to both QCTB and the Moscow Field Office. Include the information requested by the enclosed letter with both portions of each sample.

Enclosed are supplies to be used for this project. Take special care to identify each sample properly and to thoroughly seal each sample in the enclosed plastic bags. A heat sealer would be best to seal the bags, but folding over several times and stapling would be adequate. Use a marking pen to write the class and sample numbers 1 through 5 on the outside of each plastic bag. Record your protein results and other information on the enclosed form and include a copy with the set that goes to QCTB and a copy with the set that goes to Moscow. Use a separate form for each class. You will have to make additional copies of the blank form for future use.

cc: Idaho Grain Inspection Service, Pocatello, Idaho
Lewiston Grain Inspection Service, Lewiston, Idaho
Montana Department of Agriculture, Great Falls, Montana
Utah Department of Agriculture, Ogden, Utah

Form [illegible]

Grain Inspected for Month of User Fee 19

For 1987 Last 6 mo.

DATE	CAR NUMBER	DATE	~~CAR NUMBER~~ Total	DATE	Protein	DATE	CAR NUM
	October		$1,432.50		$449.40		
	September		$2,012.85		668.80		
	August		$1,697.90		575.20		
	July		877.05		350.40		
	June		1076.20		359.60		
	May		854.70		364.60		
			$7,951.20		$2,768.00		

Changes in Protein Certification

Effective May 1, 1987 NIR protein results will no longer be determined on an "as is" moisture basis. All results will be shown on 12% basis. The following chart will show how that change will impact certificated results at different protein and moisture levels. Values are typical.

"As is" formula: $$\frac{\text{NIR Protein X(100 - Motomco Moisture)}}{\text{(100 - NIR Moisture)}}$$

12% basis: $$\frac{\text{NIR Protein X(100 -12)}}{\text{(100 - NIR Moisture)}}$$

NIR PROTEIN	MOTOMCO MOISTURE	NIR MOISTURE	AS IS PROTEIN	12% MOISTURE PROTEIN	DIFFER.
8.0	14.0	12.0	7.8	8.0	+0.2
8.0	13.0	11.2	7.8	7.9	+0.1
8.0	12.0	10.6	7.9	7.9	0.0
8.0	11.0	10.3	7.9	7.8	-0.1
8.0	10.0	9.4	7.9	7.8	-0.1
8.0	9.0	8.6	8.0	7.7	-0.3
8.0	8.0	7.8	8.0	7.6	-0.4
10.0	14.0	12.0	10.0	9.8	+0.2
10.0	13.0	11.2	9.9	9.8	+0.1
10.0	12.0	10.6	9.8	9.8	0.0
10.0	11.0	10.3	9.9	9.8	-0.1
10.0	10.0	9.4	9.9	9.7	-0.2
10.0	9.0	8.6	10.0	9.6	-0.4
10.0	8.0	7.8	10.0	9.5	-0.5
12.0	14.0	12.0	11.7	12.0	+0.3
12.0	13.0	11.2	11.8	11.9	+0.1
12.0	12.0	10.6	10.6	11.8	0.0
12.0	11.0	10.3	11.9	11.8	-0.1
12.0	10.0	9.4	11.9	11.6	-0.3
12.0	9.0	8.6	11.9	11.5	-0.4
12.0	8.0	7.8	12.0	11.4	-0.6
14.0	14.0	12.0	13.7	14.0	+0.3
14.0	13.0	11.2	13.7	13.9	+0.2
14.0	12.0	10.6	13.8	13.8	0.0
14.0	11.0	10.3	13.9	13.7	-0.2
14.0	10.0	9.4	13.9	13.6	-0.3
14.0	9.0	8.6	13.9	13.5	-0.4
14.0	8.0	7.8	14.0	13.4	-0.6
16.0	14.0	12.0	15.6	16.0	+0.4
16.0	13.0	11.2	15.7	15.8	+0.1
16.0	12.0	10.6	15.7	15.7	0.0
16.0	11.0	10.3	15.9	15.7	-0.2
16.0	10.0	9.4	15.9	15.5	-0.4
16.0	9.0	8.6	15.9	15.4	-0.5
16.0	8.0	7.8	16.0	15.3	-0.7

United States
Department of
Agriculture

Federal Grain
Inspection
Service

Washington,
D.C.
20250

July 22, 1987

Honorable Keith C. Kelly, Director
Montana Department of Agriculture
Agriculture/Livestock Bldg.
Capitol Station
Helena, Montana 59620

Dear Director Kelly:

The enclosed document (two originals) designates your agency to perform official functions under the authority of the U.S. Grain Standards Act. Please sign, date, and indicate your title in the spaces provided on page 2 of both documents. Retain one document for your agency's official files,and return the other directly to us at the following address:

USDA, FGIS, Compliance Division
Review Branch - Room 1647, S. Bldg.
1400 Independence Avenue, S.W.
Washington, DC 20250

Please check Appendix B of the document for accuracy. Indicate any changes on our copy and return the entire signed document to us. Retain your copy, and we will return a corrected Appendix B to you.

Also enclosed is a designation certificate, issued by the Director of the Compliance Division, which notes the term of the designation.

We look forward to a continuing good working relationship with your agency.

Sincerely,

James R. Conrad, Chief
Review Branch
Compliance Division
(202) 447-8525

Enclosures

DESIGNATION AS AN OFFICIAL AGENCY
FOR OFFICIAL INSPECTION
UNDER THE U.S. GRAIN STANDARDS ACT, AS AMENDED
FROM THE FEDERAL GRAIN INSPECTION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE
TO
Montana Department of Agriculture

This designation to perform official inspection functions, within the geographic area specified in Appendix A, is granted pursuant to the provisions of the U.S. Grain Standards Act, as amended (7 U.S.C. 71 et seq.) (Act) and the regulations under the Act (7 CFR 800 et seq.)(regulations).

The Agency shall perform all functions in accordance with and comply with all requirements of the Act, regulations, and Federal Grain Inspection Service (FGIS) instructions in effect at the time of designation or which may be promulgated subsequently.

The Agency and the officials specified in Appendix B shall be responsible for all official actions of the official inspection personnel employed by the Agency, for direct supervision of the daily official activities of such personnel, and for the conduct of official functions and related activities of the Agency.

Where feasible, the Agency shall rotate licensees among elevators and other locations so that no licensee is detailed at one location excessively.

The Agency or personnel employed by the Agency shall not engage in any outside work or activity that consists in whole or in part of performing unofficially any function or related activity that the Agency has been designated to perform officially.

Section 7(j) of the Act requires the Agency to pay to FGIS such fees as established to cover the estimated cost to FGIS relating to supervision of the Agency and related administrative costs.

The Agency shall advise the Compliance Division, FGIS, immediately of any proposed change in name, ownership, officers or directors, or control of the Agency; and if a trust, any amendment to the trust agreement or of a change in the person of the trustee(s). The Agency also shall advise the Compliance Division, FGIS, in advance of any change in the specified service points listed in Appendix B.

The assigned geographic area specified in Appendix A may be amended upon request by the Agency if FGIS determines that such amendment is consistent with the provisions and objectives of the Act, regulations, and instructions. The Agency shall pay to FGIS the fee prescribed by the regulations for each amendment of this designation.

This designation shall terminate on the date herein stated and may be renewed in accordance with Section 7(g)(1) of the Act. The Agency may request that this designation be voluntarily canceled by giving 90 days written notice to FGIS. FGIS may revoke this designation in accordance with Section 7(g)(3) of the Act.

If the Agency is a trust or subsidiary established to address a conflict of interest prohibited by Section 11 of the Act, the designation shall terminate upon dissolution of the Agency and shall not revert to the trustees or the parent corporation.

The signatories certify that they have the authority to enter into said designation.

This designation and the responsibilities thereunder are accepted for Montana Department of Agriculture.

Keith Kelly
Signature (Agency)

10 Aug 87
Date

KEITH KELLY
Name (typed or legibly printed)

DIRECTOR, MT. DEPT. of AGRICULTURE
Title

This designation is approved by the Federal Grain Inspection Service. It is effective on September 1, 1987, and will terminate on August 31, 1990.

Signature (FGIS)

July 17, 1987
Date

J. T. Abshier
Name

Director, Compliance Division
Title

APPPENDIX A - ASSIGNED GEOGRAPHIC AREA

Montana Department of Agriculture

Pursuant to Section 7(f)(2) of the U.S. Grain Standards Act, as amended, the following geographic area, the entire State of Montana, is assigned to the Montana Department of Agriculture.

APPENDIX B - OFFICIALS AND SPECIFIED SERVICE POINTS

Montana Department of Agriculture

State Officials: Keith C. Kelly, Director
O. Roy Bjornson, Administrator, Plant Industry Division
Rex L. Denning, Bureau Chief, Grain Standards Bureau

Headquarters Location:

Montana Department of Agriculture
Agriculture/Livestock Bldg.
Capitol Station
Helena, MT 59620

Specified Service Points:

Montana Department of Agriculture
821 17th Street North
P.O. Box 1397
Great Falls, MT 59403

ADDITIONAL TESTIMONY: BARLEY PROTEIN WITH NIR

PROPOSED FGIS MALTING BARLEY PROTEIN WITH NIR

APRIL 1, 1987 - Talked to Dr. Koeltzow; found out FGIS hadn't done any testing to see if irrigated and dryland or different varieties could be run with common filters and bias settings on NIR protein analyzers.

APRIL 10, 1987 - Sent letter through Larry Zehm to Theron Anthony suggesting FGIS expand their testing to include areas Montana had found created problems. (See attachment #1.)

APRIL 27, 1987 - Received letters from Theron Anthony and Gail Jackson which indicated FGIS wasn't taking into account the way malting barley is grown, bought, sold, shipped, or utilized at destination. (See attachment #2.)

Apparently FGIS is using the same theory with malting barley as with wheat in regards to barley NIR proteins.

PROBLEMS

Malting barley is grown, bought, sold, shipped, and utilized as pure varieties. All malting barley varieties are not binned in a common bin according to protein as wheat is.

FGIS testing with two rowed barley still includes pirolene even though their hasn't been any, or very little, domestic malting barley sales of pirolene for two years.

FGIS hasn't tested Harrington because it is not an FGIS approved variety. Harrington is the second largest variety next to Klages in sale volume in Montana and should be included in the FGIS testing program. Preliminary testing in the private sector indicates that Harrington run on a channel that gives accurate results for Klages has an approximate 1.0% difference if run on the same bias setting as Klages.

An accurate malting barley NIR program will have to give results equal to Kjeldahl system on all varieties run individually.

FGIS planned to certify protein to the nearest 0.5%. Has this been discussed with domestic malting barley users? Is this acceptable to the malting barley trade?

We suspect the large standard expected deviation FGIS has experienced is due to using different varieties for their testing without regard to how many or which varieties were being tested.

SUGGESTIONS

On filter and bias settings that have been established by FGIS, I recommend the following varieties grown in Montana be tested.

- A minimum of 50 pure irrigated Klages.
- A minimum of 50 pure dryland Klages.
- A minimum of 50 pure dryland Harrington.
- A minimum of 50 pure irrigated Clark.
- A minimum of 50 pure dryland Clark.
- A minimum of 50 pure dryland Morex.

This would prove if a common bias can be used.

SUMMARY

We hope that FGIS can develop an accurate malting barley protein program using an NIR analyzer. If this is not possible, we feel it would be in the best interest of the malting barley industry and growers to leave the present system as is. An inaccurate official system, if implemented, would leave malting barley growers with no recourse for protein differences with the trade.

Attachment # 1

04/22/1997 07:28 **** HQ FGIS WASH D.C. 202 447 4629 P.01

UKG + Kme FLIL

✓ Gail Jackson

Rax

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
GRAIN STANDARDS BUREAU
821 17TH STREET NORTH — P.O. BOX 1387
GREAT FALLS, MONTANA 59403

TED SCHWINDEN
GOVERNOR

TELEPHONE:
AREA CODE [illegible]

KEITH KELLY
DIRECTOR

DIR ✓
D/DIR
MSR
RAL

APRIL 10, 1987

Mr. Tharon Anthony
Area Chief, Domestic Program
Field Management Division

Dear Mr. Anthony

The Montana State Grain Standards Bureau would like to comment regarding the FGIS proposal to supervise Malting Barley proteins. We feel the only accurate method, at the present time, for determining Malting Barley protein is the Kjeldahl system. In the past we tried unsuccessfully to operate a Malting Barley protein program using a NIR analyzer.

In Montana, we have numerous varieties of Malting Barley grown on both irrigated and dryland farms. Our testing with the NIR protein system indicated we couldn't achieve accurate protein results without using a separate analyzer channel for each different Malting Barley variety. Testing also indicated we had to use a separate analyzer channel for irrigated and dryland Malting Barley of the same variety. We also found it was difficult to repeat a Malting Barley protein analysis twice, within reasonable tolerance limits, on the same sample.

We feel part of this problem could be the ground flour consistency or particle size. It might be possible to solve some of these problems using a flour grinder other than the UD grinder.

Until these problem areas are explored and resolved we oppose the FGIS proposal to supervise Malting Barley proteins using the NIR system.

RECEIVED
APR 21 1987

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
GRAIN STANDARDS BUREAU
921 17TH STREET NORTH — P.O. BOX 1387
GREAT FALLS, MONTANA 59403

TED SCHWINDEN
GOVERNOR

TELEPHONE:
AREA CODE 406
[illegible]

KEITH KELLY
DIRECTOR

In the calendar year 1986 $17,000 of our income was derived from Malting Barley protein analysis. We feel the Malting Barley industry will discontinue using our laboratory for Malting Barley analysis if any system is implemented which does not equal accuracy levels achieved with the Kjeldahl system.

As a designated official laboratory, we do not oppose the FGIS supervision of Malting Barley proteins on the Kjeldahl system, or an NIR system if equal results can be achieved.

At this time we strongly request that if the FGIS undertakes supervision of Malting Barley proteins the Kjeldahl system remain approved as an alternate protein analysis method.

Sincerely,
Allen Williams
Allen Williams
Grain Laboratory Supervisor

cc: Mr. John Marshall ✓
Mr. Larry Zehm

AW

TOTAL P.02

Attachment # 2

Rex

United States
Department of
Agriculture

Federal Grain
Inspection
Service

Washington,
D.C.
20250

April 27, 1987

Mr. Allen Williams
Grain Laboratory Supervisor
State of Montana Department of Agriculture
Grain Standards Bureau
P.O. Box 1397
Great Falls, Montana 59403

Dear Mr. Williams:

Thank you for your letter of April 10, 1987, concerning barley proteins. A copy of your letter has been forwarded to Gail Jackson, Director, Standardization Division for response. The Standardization Division is responsible for developing procedures and tolerances for barley protein. If you have additional questions or concerns, please contact Mr. Jackson at:

Standardization Division
USDA, FGIS Technical Center
P.O. Box 20285
Kansas City, MO 64195
Telephone Number: (816) 374-7577

Sincerely,

G Tharon Anthony

G. Tharon Anthony, Chief
Interior Program
Field Management Division

The Federal Grain Inspection Service
is an agency of the
United States Department of Agriculture

United States
Department of
Agriculture

Federal Grain
Inspection
Service

Standardization Division
P. O. Box 20285
Kansas City, Missouri 64195
816-891-6505

May 1, 1987

Mr. Allen Williams
State of Montana
Department of Agriculture
Grain Standards Bureau
P. O. Box 1397
Great Falls, Montana 59403

Dear Mr. Williams:

I have been asked to respond to your letter to Mr. Tharon Anthony dated April 10, 1987, in which you commented on the problems of measuring barley protein using NIR.

As you know from your recent telephone conversation with Don Koeltzow, Chief of Research and Development Branch, FGIS is involved in a series of collaborative studies designed to test our barley protein calibration equations, and I have included the data from the most recent test. Barley samples were obtained from the grain marketing channels in North Dakota, Idaho, Washington, South Dakota, Montana, and Minnesota. These samples were used to develop calibration equations for the Dickey-john GAC III and the Technicon (TN)-400. Reference samples were selected and used to slope and bias adjust 5 Dickey-johns and 5 TN-400s in field offices. These offices, on the enclosure, are labeled A through E for the Dickey-johns and F through J for the TN-400s. Ground samples were sent out in sealed bags and were used to adjust the slopes and bias for moisture. Moisture and protein data are included on an "as is" basis, and protein values have also been converted to a "dry" basis. Values reported in the Average column are the averages of the NIR data from the five field offices. Values reported under the LAB column are Kjeldahl values in the protein tables and air oven values in the moisture tables.

As you can see from the dry basis data, the standard error of prediction (SEP) ranged from .208 to .307 for the TN-400s and from .269 to .485 for the Dickey-johns. Thus, our current plan is to certify barley NIR protein reported to the nearest 0.5%. Values of x.26 to x.75 would be reported as x.5 and values from x.76 to (x+1).25 would be reported as (x+1).0% protein. We would also like to see these values reported on a constant moisture basis as we are now doing for wheat.

We agree that much of the larger SEP (when compared to wheat) is probably due to grinding difficulties encountered with barley, and you may be correct in stating that another grinder other than the UDY might do a better job. We have certainly found it impractical to use the current UDY automatic feeder with barley.

The Federal Grain Inspection Service
is an agency of the
United States Department of Agriculture

Some of the problems with different varieties of barley and with irrigated versus dry land crops which you mentioned to Dr. Koeltzow on the telephone may not show up because of the blending of grain which occurs in normal grain marketing channels. As the calibration equation is updated, the differences which do exist should even out.

I welcome your comments on the enclosed collaborative data, and I would be happy to discuss other issues regarding NIR barley protein measurement with you as well as have our Research and Development Branch study "problem samples" which you might find in your region.

Sincerely,

N. Gail Jackson

N. Gail Jackson
Director

Enclosure → Collaborative Data can be obtained by writing to: U.S. Department of Agriculture
FGIS
STANDardization Division
P.O. Box 20285
KANSAS City, Missouri 64195

call- 816-891-6505

cc: Tharon Anthony
John Marshall
John Halverson
Larry Zehm

Senator **Melcher**. Thank you, Keith.

Our next witness is Rex Denning, Chief Grain Inspector for the Montana Department of Agriculture.

STATEMENT OF REX L. DENNING, CHIEF GRAIN INSPECTOR, GRAIN STANDARDS BUREAU, MONTANA DEPARTMENT OF AGRICULTURE, GREAT FALLS, MT

Mr. **Denning**. Thank you, Senator.

For the record, my name is Rex L. Denning. I am the Chief Grain Inspector for the State of Montana.

Mr. Chairman, members of the committee, I appreciate this opportunity to discuss several procedural and technical problems evolving around written and verbal protein calibration adjustments on NIR machines between April 14 and July 8, 1987.

The following is a description of detailed events concerning the lowering of Hard Red Spring wheat protein baseline values.

April 14, 1987, I was instructed by Larry Zehm of the Moscow, Idaho, field office to lower Hard Red Spring wheat protein baseline values 0.2 of a percent, effective at 8 a.m., the following day, April 15, 1987.

On April 15, these instructions were carried out.

May 4, 1987, the Grain Standards Bureau was instructed, per written notification from Dr. C.A. Watson, to commence using new national reference samples with the baseline value for Hard Red Spring wheat being 13.89.

That same day, May 4, 1987, LeRoy Baker from the Moscow, Idaho, field office, called and instructed me to lower the baseline values on Hard Red Spring wheat from 13.89 to 13.69.

Mr. Chairman, from here on, I mention the name of Al Williams. I want to make it clear who he is. Mr. Williams is the Protein Coordinator for the State of Montana and, in my opinion, there is not a more qualified person for this position. Mr. Baker from the Moscow field office can attest to this.

June 15, 1987, Al Williams of the Montana Grain Standards Bureau was instructed by Larry Zehm, FGIS field office, to raise the Hard Red Spring wheat protein baseline from 13.69 to 13.79. Larry assured Mr. Williams that this was a nationwide raise, and instructed firmly that this was not to be announced. Al protested to Larry about the change not being made public.

June 16, 1987, LeRoy Baker of the Moscow, Idaho field office told Al Williams that a mistake had been made. He said that in Dr. Watson's absence, the new national reference samples for Hard Red Spring wheat lowered 0.2 percent on May 4 was done in error. The June 15 raise of 0.1 percent was to compensate for half of this error, and the other 0.1 percent raise would be taken care of sometime in August. Mr. Williams told Mr. Baker he felt this should be corrected immediately.

June 29, 1987, Al Williams talked to Bill Brookreson of Washington State and was told that as of yet, they had not raised their protein level on June 15, as Larry Zehm had stated would take place. At that time, Bill Brookreson made the same statement that LeRoy Baker had made about the error happening when Dr. Watson was on vacation. Mr. Williams informed me of his conversation. I instructed him to call Dr. Watson in Kansas City for further information. Dr. Watson informed Mr. Williams that this error was made while he was on vacation. Dr. Watson recommended that the correction be made immediately, but was denied, and was told that the error would be rectified by 0.1 percent raise in June and 0.1 percent raise in August. It was inferred to Al Williams that certain positions in FGIS would be in jeopardy if the public found out about this problem.

Mr. Williams strongly protested the handling of this matter.

July 1, 1987, Al Williams and myself were called to Helena to meet with Keith Kelly and Roy Bjornson concerning this matter. At that time, we explained all the events that had transpired on the lowering and raising of Hard Red Spring wheat protein baseline values by FGIS. Al and myself expressed deep concern for recent changes in Hard Red Spring wheat proteins. We informed Mr. Kelly of an unusual amount of changes in Hard Red Spring wheat biases, and a change of the usual procedures followed by the FGIS, and unsubstantiated rumors from the inspection field. We recommended to Mr. Kelly to approach this with extreme caution because this was made clear from FGIS that this was not to be disclosed; and being an FGIS-designated office, it was not in our best interest to be involved in a controversy unless he—referring to Mr. Kelly—had more information. This was also the first time in Al's and my careers, which constitutes over 50 years experience, that this type of order from FGIS had ever been given. It was noted that I had waited long enough for a written response from Larry Zehm because, in the past, FGIS had always sent written verification on any instructions given by them. I was instructed to get written verification at this time.

July 2, 1987, I requested written verification from Larry Zehm of the instruction issued on June 15, 1987, to raise baseline values of Hard Red Spring wheat from 13.69 to 13.79.

July 8, 1987, I received a phone call from Larry Zehm stating that he was instructed not to give written verification of the instruction to raise baseline values of Hard Red Spring wheat from 13.69 to 13.79 because his instructions were also verbal. He stated he had been instructed not to give any written verification on this matter.

The Montana Grain Standards Bureau takes great pride in following all instructions from the Montana Department of Agriculture and the Federal Grain Inspection Service. We have an excellent working relationship with the State Department and the FGIS field office, Moscow, Idaho. All of our past onsite reviews substantially reflect this.

Mr. Chairman, the attached correspondence is what took place from the Montana Grain Standards Bureau and the Montana Department of Agriculture in Helena.

Thank you.

[The prepared statement of Mr. Denning follows:]

Joint Hearing

USDA - FGIS - Protein Determination
of Hard Red Spring Wheat

Senate Subcommittee on Agriculture Production
And Stabilization of Prices

House Subcommittee on Wheat, Soybeans, and Feed Grain

DATE: NOVEMBER 10, 1987
TIME: 10:00 A.M.
PLACE: ROOM 332, Russell Building
WASHINGTON, D.C.

STATEMENT OF REX L. DENNING, CHIEF GRAIN INSPECTOR, GRAIN STANDARDS BUREAU, MONTANA DEPARTMENT OF AGRICULTURE, GREAT FALLS, MONTANA

Mr. Chairman, members of the committee, I appreciate this opportunity to discuss several procedural and technical problems evolving around written and verbal protein calibration adjustments on NIR machines between April 14 and July 8, 1987.

The following is a description of detailed events concerning the lowering of hard red spring wheat protein baseline values.

APRIL 14, 1987 - I was instructed by Larry Zehm of the Moscow, Idaho field office to lower hard red spring wheat protein baseline values 0.2% effective at 8:00 a.m., the following day, April 15, 1987.

On April 15 these instructions were carried out.

APRIL 16, 1987 - I was contacted by Keith Kelly via telephone on a telephone conference call. To my knowledge those present were Keith Kelly and Senator Ted Neuman and myself. At that time I was asked how the 0.2% change in the protein baseline values had come about. I suggested to them that I felt there had been poor management and supervision in the protein department at FGIS. (I was later informed that questions concerning this matter were to be directed to John Bair, FGIS area program chief.)

MAY 1, 1987 - The national protein determinations were changed from an "as is" basis to a 12% moisture basis as per instruction from FGIS.

(EXAMPLE: 10% moisture and 14% protein sample calculated on a 12% moisture basis, comes out 13.7%)

MAY 4, 1987 - The Grain Standards Bureau was instructed per written notification from Dr. C.A. Watson to commence using new national reference samples with the baseline value for hard red spring wheat being 13.89.

That same day, May 4, 1987, LeRoy Baker from the Moscow, Idaho field office called and instructed me to lower the baseline values on hard red spring wheat from 13.89 to 13.69. After some protest, I proceeded to follow these instructions. Total changes on Montana hard red spring wheat in a 3 week period were -0.7%. Example: April 15: -0.2, May 1: -0.3 (12% moisture basis), May 4: -0.2.

JUNE 15, 1987 - Al Williams of the Montana Grain Standards Bureau was instructed by Larry Zehm, FGIS field office, to raise the hard red spring wheat protein baseline from 13.69 to 13.79. Larry assured Mr. Williams that this was a nationwide raise and instructed firmly that this was not to be announced. Al protested to Larry about the change not being made public.

JUNE 16, 1987 - LeRoy Baker of the Moscow, Idaho field office told Al Williams that a mistake had been made. He said that in Dr. Watson's absence the new national reference samples for hard red spring wheat lowered 0.2% on May 4 was done in error. The June 15 raise of 0.1% was to compensate for half of this error, and the other 0.1% raise would be taken care of some time in August. Mr. Williams told Mr. Baker he felt this should be corrected immediately.

Mr. Williams called me at home to report on this incident.

WEEK OF JUNE 22, 1987 - I called O. Roy Bjornson and explained everything that had transpired to-date concerning this matter.

JUNE 29, 1987 - Al Williams talked to Bill Brookerson of Washington State and was told that as of yet they had not raised their protein level on June 15 as Larry Zehm had stated would take place. At that time, Bill Brookerson made the same statement that LeRoy Baker had made about the error happening when Dr. Watson was on vacation. Mr. Williams informed me of his conversation. I instructed him to call Dr. Watson in Kansas City for further information. Dr. Watson informed Mr. Williams that this error was made while he was on vacation. Dr. Watson recommended that the correction be made immediately, but was denied, and was told that the error would be rectified by 0.1% raise in June, and 0.1% raise in August. It was referred to Al Williams that certain positions in FGIS would be in jeopardy if the public found out about the problem.

Mr. Williams strongly protested the handling of this matter.

JULY 1, 1987 - Al Williams and myself were called to Helena to meet with Keith Kelly and O. Roy Bjornson concerning this matter. At that time, we explained all events that had transpired on the lowering and raising of the hard red spring wheat protein baseline values by FGIS. Al and myself expressed deep concern over recent changes in hard red spring wheat proteins. We informed Mr. Kelly of an unusual amount of changes in hard red spring wheat biases and a change of the usual procedures followed by the FGIS and unsubstantiated rumors from the inspection field. We recommended to Mr. Kelly to approach this with extreme caution because this was made clear from FGIS this was not to be disclosed and being an FGIS designated office, it was not in our best interest to be involved in a controversy unless he had more information. This was also the first time in Al and my careers, which constitutes over 50 years experience, that this type of order from FGIS had ever been given. It was also noted that I had waited long enough for a written response from Larry Zehm, because in the past, FGIS has always sent written verification on any instructions given by them. I was instructed to get written verification at this time.

JULY 2, 1987 - I requested written verification from Larry Zehm of the instruction issued on June 15, 1987 to raise baseline values of hard red spring wheat from 13.69 to 13.79.

JULY 8, 1987 - I received a phone call from Larry Zehm stating that he was instructed not to give written verification of the instruction to raise baseline values of hard red spring wheat from 13.69 to 13.79 because his instructions were also verbal. He stated he had been instructed not to give any written verification on this matter.

SUMMARY

The Montana Grain Standards Bureau takes great pride in following all instructions from the Montana Department of Agriculture and the Federal Grain Inspection Service. We have an excellent working relationship with the State Department and the FGIS Field Office, Moscow, Idaho. All of our past on-sight reviews substantially reflect this.

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
OFFICE OF THE DIRECTOR
AGRICULTURE/LIVESTOCK BLDG.
CAPITOL STATION
HELENA, MONTANA 59620-0201

TED SCHWINDEN
GOVERNOR

TELEPHONE
AREA CODE 406
444-3144

KEITH KELLY
DIRECTOR

November 2, 1987

Mr. W. Kirk Miller, Administrator
USDA - FGIS
Room 1094-S
1400 Independence Avenue SW
Washington, DC 20250

Dear Mr. Miller:

Thank you for your letter dated October 30, 1987 concerning FGIS's wheat protein program.

It appears that a number of questions still remain unanswered as to the reasons for the fluctuation in baseline protein values on Hard Red Spring Wheat. As stipulated in my letter of October 6, verbal instructions to raise the protein baseline 0.1% on June 16, 1987 were not confirmed by written documentation. On other occasions such as April 15 and May 4, 1987 we did receive written instructions in accordance with FGIS's historical operating procedures. Also, the reasons for raising the Hard Red Spring Wheat protein baseline from 13.69% to 13.79% still raises some questions.

In conclusion, it appears that our grain lab and other grain labs in the northwest region are testing Hard Red Spring Wheats from protein with a calibration base that is, in our opinion, 0.1% too low.

Senator Melcher and Representative Marlenee's November 9th hearing by the Senate Subcommittee on Agricultural Production and Stabilization of Prices may provide the explanation requested; however, I would appreciate your response to my inquiry.

Sincerely,

Keith Kelly

Keith Kelly
Director

WRP/pb

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United States
Department of
Agriculture

Federal Grain
Inspection
Service

Washington,
D.C.
20250

October 30, 1987

Mr. Keith Kelly, Director
State of Montana
Department of Agriculture
Plant Industry Division
Capitol Station
Helena, Montana 59620

Dear Mr. Kelly:

Thank you for your letter of October 6, 1987, regarding FGIS' wheat protein program. I appreciate the opportunity to respond to your concerns.

The action that FGIS took on April 15, 1987, was not a recalibration - it was a simple downward bias adjustment of 0.2 percent on all official protein instruments. The exact same type of adjustment, either up or down, is made daily on individual instruments. In this case, the national bias adjustment was made as a quick fix to problems in the calibration.

The calibration involves a complex series of mathematical calculations to arrive at a set of constants. These constants are programmed into the electronic NIR device enabling it to arrive at the protein figure. When the calibration is off, as it is, problems arise. The bias adjustment is a fast way to approximate the correct calibration. FGIS is currently developing the correct calibration which will soon be ready for implementation.

Prior to FGIS actions, protein discrepancies in U.S. wheat exports were the most common of the foreign complaints. Since we moved to correct the problem, not one foreign complaint based on protein has been registered. U.S. Wheat Associates, the national organization of the Montana Wheat Research and Marketing Committee, feels strongly that our actions were appropriate and vital to the interests of U.S. wheat farmers.

Thank you again for your interest. I hope I have adequately addressed your concerns.

Sincerely,

W. Kirk Miller
Administrator

The Federal Grain Inspection Service
is an agency of the
United States Department of Agriculture

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
CAPITOL STATION
HELENA, MONTANA 59620

TED SCHWINDEN
GOVERNOR

TELEPHONE
AREA CODE 406
444-3730

KEITH KELLY
DIRECTOR

ORAN ROY BJORNSON
ADMINISTRATOR

October 6, 1987

W. Kirk Miller, Administrator
USDA-FGIS
Room 1094-S
1400 Independence Avenue S.W.
Washington, D.C. 20250

Dear Mr. Miller:

The purpose of this letter is to request a written explanation regarding the recent lowering and raising of the protein baseline for Hard Red Spring Wheat.

It is my understanding that several states including our own received verbal instructions to raise the protein baseline 0.1% on June 16, 1987. There has been a lot of discussion that FGIS issued in error the original recalibration of NIR equipment when the protein baseline was lowered 0.2% for Hard Red Spring Wheat.

Unfortunately, the subsequent lowering and raising of the protein baseline has cost Hard Red Spring Wheat farmers in Montana substantial losses in protein premiums.

I am looking forward to your explanation. Thank you.

Sincerely,

Keith Kelly

Keith Kelly
Director

ORB/mc

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STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
GRAIN STANDARDS BUREAU
[illegible] 17TH STREET NORTH — P.O. BOX [illegible]
GREAT FALLS, MONTANA 59403

TED SCHWINDEN
GOVERNOR

TELEPHONE:
AREA CODE 406
[illegible]

KEITH KELLY
DIRECTOR

October 5, 1987

D. Roy Bjornson
Administrator
Plant Industry Division
Capitol Station
Helena, Montana 59620

Dear Roy,

In reference to the recent growing interest in Hard Red Spring Wheat Protein changes by the FGIS; I am submitting the following chronological chain of events:

> April 15, 1987-- The Grain Standards Bureau was instructed by the FGIS to lower the Hard Red Spring Wheat Standard Reference samples by 0.2%. (Re:Attachment #1)
>
> May 4, 1987-- The Grain Standards Bureau was instructed per written notification from Dr. C.A. Watson, to commence using new National Reference Samples with the baseline value for Hard Red Spring Wheat being 13.89.
>
> That same day, May 4, LeRoy Baker from the Moscow Field Office (our federal supervisory office) called and instructed me to lower the baseline values on Hard Red Spring Wheat from 13.89 to 13.69. After some protest, I proceeded to follow those instructions. (Re:Attachment #2)

We received a follow-up letter from the Kansas City Office verifying the phone instructions of LeRoy Baker. (Re:Attachment #3)

Concerning the above information, I would like to say that we have been informed by several FGIS sources that the instruction given to change Hard Red Spring Wheat from 13.89 to 13.69 was done in error and that Dr. Watson was on vacation at the time the instruction was issued. To date, nothing has been done to correct this.

> June 15, 1987-- The Grain Standards Bureau was instructed by Larry Zehm, FGIS Field Office Supervisor, to raise the Hard Red Spring Wheat Protein baseline from 13.69 to 13.79. I sent written notification of this instruction to you. (Re: Attachment #4)
>
> July 2, 1987-- I requested written verification of the instruction issued to raise baseline values of Hard Red Spring Wheat to 13.79. (Re:Attachment #5)

July 8, 1987-- I received a phone call from Larry Zehm stating that he was instructed not to give written verification of the instruction to raise baseline values of Hard Red Spring Wheat because his instructions were also verbal only. (Re:Attachment #6)

I have followed all FGIS instructions. It is my opinion that many questions may arise from this issue. I feel the error has only been 50% rectified.

I would like to reiterate that our records here at the Grain Standards Bureau are in compliance with all State/Federal rules and regulations.

Upon directive from you, they are open for inspection.

I would like to refer any requests and/or correspondence concerning this matter directly to you.

Please advise.

Sincerely,

Rex L. Denning

Rex L. Denning
Bureau Chief

ATTACHMENT #1

Posted: Tue Apr 14, 1987 10:55 AM EST Msg: DGIH-2413-3246
From: JMARSHALL
To: field.offices
CC: fgis.mgt, aclase, cawatson, dshipman, rpforr, area.chiefs
S ': Biasing Protein Instruments
SUBJECT: Biasing Protein Instruments

Effective April 15, 1987, at 12:01 a.m., the established base line value for the Hard Red Spring Standard Reference Sample (SRS) values shall be lowered by 0.2 percent protein and all near-infrared (NIR) instruments rebiased accordingly.

Each field office is responsible for contacting official agencies in their circuit and notifying them of this change.

If you have any questions regarding this change, please call your respective area program chief.

John Bair
202-382-0219

Action?

Command?

Rec
4-16-87
RID

ATTACHMENT #2

United States Department of Agriculture

Federal Grain Inspection Service

USDA-FGIS Technical Center-ST
Quality Control Branch
P. O. Box 20285
Kansas City, MO 64195

April 8, 1987

TO: All Field Offices and Specified Service Points Analysing HRW and HRS Wheat for Protein

FROM: C. A. Watson, Branch Chief
Quality Control Branch C. A. Watson

SUBJECT: National Reference Samples

Five HRW and five HRS wheat samples are being sent to you under separate cover. These samples are the National Reference Samples (RS) for HRW and HRS wheat. All specified service points shall commence using these samples effective May 4, 1987.

The protein and moisture values shown below were established by the Quality Control Branch. These values shall be used to bias the NIR instruments for HRW and HRS wheat, respectively. The instructions for biasing are found in the Grain Inspection Handbook, Book V, Chapter 3, pp. 3-1 to 33-4 (copy enclosed). Contrary to p. 3-1, para. B.2., the moisture baseline value provided below shall be used.

Sample No.		NIR Protein % (12% mb)			Moisture %	
		HRW	HRS			
1	10.9	10.92	11.19	10.99	9.30	9.3
2	12.8	12.75	12.99	~~13.0~~ 12.79	8.45	8.5
3	13.5	13.50	13.61	~~13.6~~ 13.41	8.84	8.8
4	13.9	13.85	14.01	~~14.0~~ 13.81	9.56	9.6
5	15.6	15.55	15.59	~~15.6~~ 15.39	8.27	8.3
6	12.0	12.00	12.17	~~12.2~~ 11.97	10.56	10.6
7	13.4	13.37	13.51	~~13.5~~ 13.31	10.01	10.0
8	14.2	14.15	14.24	~~14.2~~ 14.04	8.75	8.8
9	15.2	15.16	15.21	~~15.2~~ 15.01	8.85	8.9
10	16.2	16.24	16.34	~~16.3~~ 16.14	9.74	9.7
Baseline(Avg.)		13.75	13.89		9.23	

13.69

cc: Jackson
Marshall

As per Phone
from LeRoy 5-4-87
Lower HRS 0.2%
RLD

The Federal Grain Inspection Service
... an agency of the ...

ATTACHMENT #3

Posted: Thu May 7, 1987 [illegible]
From: CAWATSON
To: SBENNETT, MBLUST, ELBR[illegible] [illegible]COVINGTON, FDOUCET, MEUSTROM,
JGENIUS,
DGROVE, CHERNDON, WHUELER, LMCDONALD, LNAFZINGER, JPHELPS,
TWRENN, GTOMS,
GWASSON, WWESTBROOK, LZEHM, JARUZEK, HDUNCAN
CC: CAWATSON
Subj: HRS NATIONAL REFERENCE SAMPLES

THE BASELINE OF THE HRS WHEAT REFERENCE SAMPLES ISSUED BY THE QUALITY CONTROL BRANCH ON APRIL 8, 1987 HAS BEEN CHANGED BY THE MEMO FROM JOHN MARSHALL DATED APRIL 14, 1987. THE NEW VALUES FOR HRS PROTEIN ARE:

SAMPLE NUMBER.	PROTEIN
1	10.99
2	12.79
3	13.41
4	13.81
5	15.39
6	11.97
7	13.31
8	14.04
9	15.01
10	16.14
AVERAGE	13.69

THE MOISTURE VALUES REMAIN THE SAME AS THE ORIGINAL BASELINE.

TED SCHWINDEN
GOVERNOR

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
GRAIN STANDARDS BUREAU
521 17TH STREET NORTH — P.O. BOX 1287
GREAT FALLS, MONTANA 59403

ATTACHMENT #4

TELEPHONE
AREA CODE 406
[illegible]

KEITH KELLY
DIRECTOR

July 8, 1987

Mr. O. Roy Bjornson
Administrator
Plant Industry Division
Capitol Station
Helena, Montana 59620-0201

Dear Roy:

On June 15, 1987 while I was on vacation, Larry Zehm, the FGIS Field Office Supervisor, called Al Williams and instructed him to raise the Hard Red Spring Wheat Protein baseline from 13.69 to 13.79 (0.1%) beginning at 8:00 AM the following day June 16, 1987.

Al followed these instructions, but to date I have not received written confirmation.

I am sending a letter to Mr. Zehm requesting this instruction in writing.

I will keep you posted on this matter.

Sincerely,

Rex L. Denning

Rex L. Denning
Bureau Chief

cc: Al Williams
    Keith Kelly

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BEST AVAILABLE COPY

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
GRAIN STANDARDS BUREAU
801 17TH STREET NORTH — P.O. BOX 1287
GREAT FALLS, MONTANA [illegible]

TED SCHWINDEN
GOVERNOR

ATTACHMENT 15
AREA CODE 406
[illegible]

KEITH KELLY
DIRECTOR

July 8, 1987

Mr. Larry Zehm
Field Office Supervisor
USDA, FGIS
Moscow, Id. 83843-0117

Dear Larry,

I am writing in reference to your phone conversation with Al Williams on June 15, 1987 pertaining to raising the Hard Red Spring Wheat Protein baseline from 13.69 to 13.79 (0.1%).

I am requesting written confirmation of your verbal instructions.

Your prompt attention to this matter will be greatly appreciated.

Sincerely,

Rex L. Denning

Rex L. Denning
Bureau Chief

cc: Roy Bjornson
Keith Kelly

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
GRAIN STANDARDS BUREAU
821 17TH STREET NORTH — P.O. BOX 1387
GREAT FALLS, MONTANA [illegible]

TED SCHWINDEN
GOVERNOR

TELEPHONE
AREA CODE 406
[illegible]

KEITH KELLY
DIRECTOR

ATTACHMENT 46

July 8, 1987

Mr. G. Roy Bjornson
Administrator
Plant Industry Division
Capitol Station
Helena, Mt 59620

Dear Roy:

This is in reference to the attached letter to Larry Zehm.

Larry called me on July 8, 1987 and told me he could not send written confirmation of his verbal instructions concerning raising Hard Red Spring Wheat Protein baseline from 13.6% to 13.7%. Larry stated that his instructions were also verbal and he was instructed not to give any written instruction on this matter. I told him I would relay the message to my supervisor and that he probably would be hearing from him.

Sincerely,

Rex L. Denning

Rex L. Denning
Bureau Chief

An Affirmative Action Equal Employment Opportunity Employer

Senator MELCHER. Mr. Denning, you gave an example here of the instructions to lower the references by 0.2 percent on April 15 and on May 1——

Mr. DENNING. OK. In reference to my prepared testimony.

Senator MELCHER [continuing]. A reduction of 0.3 percent because of the 12 percent moisture basis; and May 4, another 0.2 percent.

Mr. DENNING. Yes, sir.

Senator MELCHER. I suspect it isn't just me, there are probably others who are wondering—whether a change in the moisture content, the moisture basis, lowers the calculation of the——

Mr. DENNING. Protein level.

Senator MELCHER [continuing]. Protein level?

Mr. DENNING. No, sir. Any calculation that's made less than 12 percent would lower any calculation made on an as is moisture; higher than 12 percent would increase protein. So in the Montana area, we figure that our average moisture is in the 10 percent area, and you calculate 10 percent moisture on a 14 protein basis, using a 12 percent moisture basis it will calculate out to a 13.7 protein. It depends on what the moisture is of the gain, how it is calculated and how it comes out. If it is exactly 12, there is no correction up or down. See, you are converting the protein to a 12 percent moisture basis.

Senator MELCHER. While you were answering, Rex, we had the notice from the House that there is a vote in progress, so I missed your response.

Mr. DENNING. OK. You calculate a 10 percent moisture Spring wheat and a 14 percent protein Spring wheat, and you calculate that out to a 12 percent moisture basis, it comes out to 13.7.

Senator MELCHER. The point of my question, though, is this: Did changing to a 12 percent moisture basis lower the calculations for protein?

Mr. DENNING. On Montana, the average moisture on Spring wheat is 10 percent. Yes, it did. And you take an average 14 range.

Senator MELCHER. You have to have the two together, then?

Mr. DENNING. Yes, sir.

Senator MELCHER. Who instructed Mr. Williams that there should not be anything but verbal orders?

Mr. DENNING. Originally—you mean June 15, sir?

Senator MELCHER. Or any of the times.

Mr. DENNING. Well, June 15, when we raised the protein level from 13.69 to 13.79, that instruction was from Larry Zehm.

Senator MELCHER. Larry Zehm then said that this was supposed to be verbal?

Mr. DENNING. Well, verbal——

Senator MELCHER. Would this ordinarily have had written confirmation of the instructions?

Mr. DENNING. Sir, a lot of this testimony implies that FGIS has always given written confirmation on every aspect of anything, and that is not necessarily true. But never in my history, as a grain inspector, have I ever requested written verification and been denied. But not necessarily have they always given it on every incidental, every little happening.

Senator MELCHER. They ordinarily give you the written instructions?

Mr. DENNING. Well, generally, depending on if it comes out of a field office, we get orders from our Moscow field office. And I looked through my records, and everything they ever send me, or everything they ever instruct us to do is followed up with written verification, and always initialed or signed by the individual. We get information from the protein coordinator back there; we get information from the supervisor. It is generally followed in written and initialed or signed.

Senator MELCHER. On May 4 there was a new samples baseline; you received written instruction from Mr. Watson. Is that correct?

Mr. DENNING. Yes, sir.

Senator MELCHER. Where does Mr. Watson reside?

Mr. DENNING. He is the Chief of the Quality Control Branch at Kansas City.

Senator MELCHER. At Kansas City?

Mr. DENNING. Yes, sir.

Senator MELCHER. So when you were told orally on May 4 to lower the baseline to 13.69, that was oral; correct?

Mr. DENNING. Yes, sir.

Senator MELCHER. And on April 15, it was oral?

Mr. DENNING. Yes, sir.

Senator MELCHER. And on May 1——

Mr. DENNING. April 15? Let me see here. April 15, that was the original. No, that was not—that was oral and followed in writing.

Senator MELCHER. There was written for that, then?

Mr. DENNING. Yes, sir.

Senator MELCHER. Was May 1 oral or written?

Mr. DENNING. May 1, on the 12-percent moisture basis?

Senator MELCHER. Yes.

Mr. DENNING. That was written. That was a change in FGIS policy, established change.

Senator MELCHER. Who gave you those written instructions?

Mr. DENNING. That was from FGIS. I'm not certain how that came, how we got that.

Senator MELCHER. That was from what?

Mr. DENNING. That was from the FGIS. The 12 percent moisture basis, that was an accepted happening that had taken place, I'm sure, way earlier than that. But that is when it went into effect.

Senator MELCHER. On May 4 you were given the instructions to lower 0.2?

Mr. DENNING. Yes, sir.

Senator MELCHER. Was that oral or written?

Mr. DENNING. That was oral; and there is a statement that followed that, without any signature or initials, but there was a correspondence that followed that.

Senator MELCHER. All right. On June 15 the baseline was raised to 13.79?

Mr. DENNING. Yes, sir.

Senator MELCHER. I believe I have got the right phrase here—you were told that was not to be announced?

Mr. **Denning**. Yes, sir. That was told to me by my protein coordinator Al Williams. He took the instructions from the field office supervisor.

Senator **Melcher**. Now, what does that mean? Who instructed him not to announce it?

Mr. **Denning**. The field office supervisor at Moscow, Idaho, instructed him.

Senator **Melcher**. Who was that?

Mr. **Denning**. Larry Zehm.

Senator **Melcher**. Where did Larry Zehm get those instructions?

Mr. **Denning**. I understand from Kansas City somewhere, sir.

Senator **Melcher**. You think Kansas City?

Mr. **Denning**. Anything to do with protein comes out of Kansas City.

Senator **Melcher**. Who would that be?

Mr. **Denning**. I am not certain.

Senator **Melcher**. Would it be Mr. Watson?

Mr. **Denning**. I would almost doubt it; but I honestly don't know. I had heard that it may have been Ron Bicsak (phonetic), but I am not sure of his capacity, even. I don't know.

Senator **Melcher**. How long have you been a grain inspector?

Mr. **Denning**. I have been working official grain inspection for over 25 years.

Senator **Melcher**. A quarter of a century.

What is broken down here? Do you know?

Mr. **Denning**. I don't know, sir. But I'll tell you one thing, when this had happened, it scared me.

Senator **Melcher**. Why did it scare you?

Mr. **Denning**. Because it is the first time in the history of my existence there that anything had ever happened that there was ever anything that reflected some shaky stuff going on. It scared me, it did.

Senator **Melcher**. Shaky stuff going on?

Mr. **Denning**. Well, that's how—you know, when somebody that supervises you issues you an instruction and says they don't want it announced and they won't file anything in writing, I don't know what that indicates. But that was the first happening in my existence, that something like that had taken place.

Senator **Melcher**. What did you think when you found out that the State of Washington wasn't doing the same thing you were doing?

Mr. **Denning**. We were terribly angry. That's an ongoing complaint, even at best. When you're trying to run the most accurate program that there is, we continually get complaints because if we are 100 percent right—I mean if it is guaranteed 100 percent right, and Washington gets 0.1 or 0.2 lower than us, that is how that grain is bought. I mean regardless.

Senator **Melcher**. Do grain companies know about this?

Mr. **Denning**. They know a lot about things that happen before we do, in all phases.

Senator **Melcher**. And they would go buy grain in Washington?

Mr. **Denning**. What's that?

Senator **Melcher**. Would they be likely to seek to buy grain in Washington instead of Montana?

Mr. Denning. I wouldn't doubt that. I don't know.

Senator Melcher. Well, what's the difference then?

Mr. Denning. Well, like I say, if an elevator ships grain to Washington and they're getting a lower protein on it in Washington and buying it from an elevator program, elevator company, they are paying him less than he paid the producer for it, for one thing. So like I say, when you try to run a perfect program here and there, there's enough inaccuracies in the system anyway, that when one is created, supposedly, then you are working against a worse problem.

Mr. Marlenee. Would the Senator yield, please?

Senator Melcher. I yield to my colleague.

Mr. Marlenee. If you think that the producers are skittish about the FGIS and Grain Inspection Service, you should talk to the elevators and the grain barge. I think this thing has got them on the verge of a nervous collapse inasmuch as the farmer is paid on the basis of what the lab in Great Falls or the Federal Grain Inspection Lab in Montana tests. They buy the grain, give the producer a check.

Then it is shipped to the west coast for export. A sample is taken again, for example, in the State of Washington and found to be 0.1 of a percent or 0.2 of a percent lower, the buyer pays on that level, and gives the elevator less money than he paid the farmer for the grain, because of the lower tests in the State of Washington that the companies are buying under—or selling under.

The foreign purchasers buy that grain and they've paid 0.1 or 0.2 of a percent less to the elevator than the elevator paid the farmer. That reflects in a very nervous position by those who are buying grain from the producer, probably resulting in them leaving a larger margin so that they can make up the difference, and the producer ultimately suffering a loss.

We have a letter in hand from one of the board of directors of a cooperative, stating that he feels that their elevator has lost about $100,000 per month under this protein situation.

Senator Conrad. Mr. Chairman, might you just yield for a moment?

I have to go preside, Mr. Chairman. But I would like to provide to you, make part of the record, a GAO report that I asked to have put together on this question. They responded to limited questions on statistical techniques and the sampling methods. The most disturbing thing, frankly, that comes from this report is that there was a failure to recalibrate the testing instruments for 5 years. Something that ought to be done annually was not done for 5 years.

So, Mr. Chairman, I would like to provide you this GAO report for submission to the record. And just to make my own observation that what I have heard here is fairly remarkable, that we have FGIS officials, supervisors telling people who must perform in the field to take certain actions that are not to be publicized, that are not in writing, that directly affect the economic outcomes for both producers and those who are elevator operators. That is fairly shocking news, and that is going to cost the system confidence of producers, elevator operators, and all the rest of us who are in the chain.

Hopefully, this GAO report, Mr. Chairman, will provide some additional reflection on what's occurred here. But I must say that I was very disturbed that for 5 years these machines, the NIR machines, were not recalibrated by FGIS. That is a malfeasance, when you have responsibility and you don't recalibrate machines that need recalibrating, as I understand it, on an annual basis, and you fail to do it for 5 years.

I want to thank the chairman for allowing me this time.

Senator MELCHER. Thank you, Senator. The GAO report that you referred to, that was developed at your request, will be made part of the record at this point.

[The GAO report referred to follows:]

United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on Agricultural Research and General Legislation, Committee on Agriculture, Nutrition, and Forestry, U.S. Senate

November 1987

GRAIN INSPECTION

Evaluation of USDA Study on Wheat Protein Measurement

GAO/RCED-88-50

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-229219

November 19, 1987

The Honorable Kent Conrad
Chairman, Subcommittee on Agricultural
Research and General Legislation
Committee on Agriculture, Nutrition,
and Forestry
United States Senate

Dear Mr. Chairman:

In your letter of July 2, 1987, you asked us to analyze a change that the U.S. Department of Agriculture's (USDA) Federal Grain Inspection Service (FGIS) made in April 1987 in wheat protein measurement. In particular, you asked that we examine (1) the statistical techniques FGIS used in performing the study on which the change was based and (2) the sampling methods FGIS used in its study. Your letter expressed concern that this change, which lowered the measured protein content of Hard Red Spring wheat, had a significant negative impact on wheat producers nationwide.

On September 17, 1987, we briefed your staff on our findings. In summary, we concluded that the statistical techniques and sampling methods FGIS used in its study were appropriate. The statistical techniques are commonly used in many disciplines and are prominently featured in general statistical methods texts. The sampling methods yielded samples appropriate for determining the changes to be made in measuring wheat protein. As requested, this report summarizes the briefing and provides information on (1) the FGIS study, (2) recent changes in FGIS' quality control program to improve the accuracy of its wheat protein measurements, and (3) responsibility for ensuring that wheat protein is accurately measured by country elevators and grain merchandisers.

Protein Content Is an Important Quality Factor in Wheat

Protein content is an important determinant of how wheat will be used. For example, Hard Red Spring wheat, the wheat class highest in protein, is used to make quality yeast breads and hard rolls. Higher protein wheat generally brings a higher price, or premium, in the market. According to an FGIS official, the premium on high protein wheat is generally based on each fifth of a percent of measured protein content. In recent years, premiums have been particularly high. In early May 1987, for example, the premium for Hard Red Spring wheat with a protein content of 15 percent was about $1.60 per bushel. The base price for Hard Red Spring wheat at that time was about $2.90 per bushel.

FGIS' Study to Determine Cause of Alleged Wheat Protein Shortages

For some time prior to the April 1987 change in wheat protein measurement, FGIS had been receiving persistent complaints from a number of U.S. export customers, particularly in Asia, that the Hard Red Spring wheat they were receiving contained less protein than what they had contracted for and less than what FGIS had certificated.[1]

In response to the complaints, FGIS selected about 600 wheat samples from various sources and analyzed the samples' protein content using two protein measurement methods—one called the Kjeldahl and the other the Near-Infrared Reflectance (NIR). The Kjeldahl, a chemical process, involves bulkier equipment, takes longer to complete, and requires a higher degree of technical expertise than the NIR. The NIR instrument, in which near-infrared light is reflected off ground grain, provides a protein reading within seconds and, in the United States, is more commonly used than the Kjeldahl. The NIR readings are based on a calibration equation that is entered into the instrument's computer memory. The equation correlates NIR readings with those provided by the Kjeldahl process, which FGIS uses as its baseline. The equation can become outdated over time as new varieties of wheat are introduced and as other factors affecting protein content, such as fertilizers and growing conditions, change.

On the basis of its analysis of the approximately 600 samples, FGIS concluded that its NIR instruments had become biased in the direction of overstating the protein content of Hard Red Spring wheat. To correct the bias, on April 15, 1987, FGIS adjusted its NIRs so that they would measure the protein content of Hard Red Spring wheat at 0.2 percentage point less than before the adjustment.[2] In addition, FGIS initiated a study to recalibrate its NIRs (i.e., update information used in the calibration equation). This recalibration was completed in September 1987.

FGIS' downward adjustment of the NIR means that the protein content of Hard Red Spring wheat will be measured more accurately but that it will measure 0.2 percentage point less than before the adjustment. For example, the protein content of Hard Red Spring wheat measured by the NIR at 14.8 percent before the adjustment, would measure 14.6 percent after the adjustment.

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[1] FGIS issues an official certificate after it completes its inspection of grain. FGIS administers a nationwide system for officially inspecting and weighing grain. While this inspection does not routinely include a protein measurement, FGIS provides such a measurement upon request and payment of a fee.

[2] These procedures became effective on May 1, 1987.

Other Issues Relevant to Your Concerns

We also discussed with FGIS officials other issues that are relevant to your concerns. The first involves changes that FGIS recently made to its quality control program to improve the accuracy of wheat protein measurements. According to FGIS officials, these changes include (1) standardizing grain coarseness by retrofitting grinders so that wheat samples will be fed into the grinder at a fixed rate before being placed in the NIR and (2) standardizing the time elapsed between grinding the wheat sample and placing it in the NIR. Both of these factors can affect protein readings. In addition, FGIS officials told us that FGIS plans to recalibrate its NIRS on an annual basis. Prior to the recent recalibration, FGIS last recalibrated its NIRS in 1982.

A second issue concerns whether FGIS has authority to ensure that wheat protein is accurately measured by other entities, such as country elevators and grain merchandisers. Although FGIS is authorized to officially test wheat for protein content under the United States Grain Standards Act, as amended (which it does only upon request and payment of a fee), no federal agency is responsible for routinely assuring that wheat protein measurements by unofficial entities are accurate.

Our analysis of the FGIS study included a review of the methods FGIS used to analyze the results of protein determinations, the appropriateness of the wheat sample sources, and the data generated by the study. We also discussed the study with FGIS officials, including the official responsible for designing and executing the study and for interpreting its results.

In addition, we obtained through discussions with FGIS officials information on (1) recent changes in FGIS' quality control program and (2) whether FGIS or any other federal agency has authority to ensure the accuracy of wheat protein measurements by other entities, such as country elevators and grain merchandisers. We did our work at USDA headquarters in Washington, D.C., during August and September 1987.

Appendix I provides information on FGIS' protein measurement study, including how protein is measured, the events leading up to the study, and how the study was conducted. Appendix II lists the main contributors to this report. FGIS officials reviewed a draft of the report and their suggestions have been included where appropriate.

As arranged with your office, unless you publicly disclose its contents earlier, we plan no further distribution of this report until 5 days from the date of this letter. At that time, we will send copies to the Secretary of Agriculture; the Administrator, FGIS; and other interested parties.

Sincerely yours,

Brian P. Crowley

Brian P. Crowley
Senior Associate Director

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Abbreviations

FGIS	Federal Grain Inspection Service
GAO	General Accounting Office
NIR	Near-Infrared Reflectance
USDA	U.S. Department of Agriculture

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Information on the FGIS Protein Measurement Study

How Wheat Protein Is Measured

Wheat protein may be measured by using the Kjeldahl method or the Near-Infrared Reflectance (NIR) instrument. The Kjeldahl method involves a somewhat elaborate chemical process which measures the amount of nitrogen in a substance. This amount, expressed as a percentage, is then multiplied by a factor of 5.7 to determine the percentage of protein in a sample of wheat. At a minimum, the process takes over 2 hours to produce a measurement. In addition, the equipment involved is bulky, and considerable technical expertise is necessary to perform the test.

The NIR, on the other hand, uses a process whereby a sample of wheat is ground and placed in the instrument, which directs near-infrared light at the sample. The amount of light reflected from the grain provides an indication of protein content. The response of the reflected light on photocells is fed into the NIR's computer, which provides a protein reading within seconds, using a previously entered calibration equation.

Calibration equations are a complex set of mathematical equations that are programmed into the NIR instrument. These equations take into account such factors as moisture levels and classes of wheat. The Federal Grain Inspection Service (FGIS) developed a new calibration equation for Hard Red Spring wheat in September 1987. Before then, it relied on a calibration equation it had developed in 1982.

According to an FGIS official, protein measurement is an inexact science. The NIR is a sensitive instrument affected by temperature, moisture, and other environmental factors. Even when the instrument is properly used and calibrated, an NIR protein measurement for the same wheat sample may vary up to plus or minus 0.2 percentage point.

Because NIRs are faster, easier to use, and less costly, they have largely replaced the Kjeldahl method in the United States as a means of measuring wheat protein. The NIR instrument is FGIS' only approved method for official protein determinations of export wheat. However, the Kjeldahl method remains the basic reference standard used in the United States. FGIS' Quality Control Branch uses the Kjeldahl method to monitor the accuracy of NIR measurements.

FGIS maintains NIRs in most of its 28 field offices. In addition, it maintains a master NIR and a master Kjeldahl in its Quality Control Branch in Kansas City, Missouri.

Why FGIS Made Its Protein Measurement Study

Starting in mid-1986, FGIS began receiving an unusually high number of complaints from U.S. grain customers, particularly in Asia, regarding protein shortages in U.S. wheat. According to FGIS officials, FGIS had received such complaints before, but these recent complaints were noteworthy because they were persistent, were more frequent, and alleged much larger protein discrepancies.

In addition, the Japanese Food Agency indicated that it was experiencing problems with protein shortages in U.S. wheat. FGIS has been involved in a joint wheat protein measurement project with the Japanese agency since 1982. Twice a year, FGIS exchanges samples of wheat with the Japanese. Protein measurements are obtained on Kjeldahl units at FGIS' Quality Control Branch laboratory and at the Japanese Food Agency laboratory. Results are then tabulated and differences compared. The results of the two Kjeldahl units have been generally uniform.

Beginning in June 1986, however, Japan began noting differences between the protein content of U.S. Hard Red Spring wheat as measured by its Kjeldahl units and as certificated by FGIS using NIR instrument readings. The average difference went from less than 0.1 percentage point prior to June 1986, to between 0.3 and 0.6 percentage point after that time. FGIS' Quality Control Branch laboratory in Kansas City analyzed the wheat samples in question using its master Kjeldahl and NIR instruments. On the average, the master NIR's readings were found to be about 0.3 percentage point higher than those of the master Kjeldahl.

How the Study Was Conducted

FGIS initiated its study at the request of U.S. Wheat Associates, a farmer-funded organization that promotes wheat sales. The organization had received repeated complaints about protein shortages in U.S. wheat shipments arriving in Southeast Asia. The study's purpose was to determine why wheat protein measurements were 0.2 percentage point or more lower than FGIS had certificated at U.S. origin. The study, conducted by the Chief of FGIS' International Monitoring Staff, consisted of three series of samples. Samples were measured for protein content using both the Kjeldahl and NIR methods.

The first series consisted of 155 samples taken from 10 vessels containing Hard Red Spring wheat on which FGIS had received formal protein complaints. Protein measurements on these samples were performed using the master Kjeldahl and NIR at FGIS' Quality Control Branch laboratory. These measurements were then compared with the measurements that had been previously taken at the loading elevators. A total of 465 protein determinations were made on these samples.

The second series consisted of 205 samples taken at the origin port from 4 vessels destined for 9 Southeast Asian mills. Each sample was divided into four equal parts: one to be tested in FGIS' Quality Control Branch laboratory, one for testing in an Agricultural Research Service quality control laboratory, one to be tested at the destination mill in Southeast Asia, and the final portion to be maintained by FGIS' International Monitoring staff for analysis using destination mill laboratory methods. In addition, samples from the shipments were collected at destination mills and sent back to FGIS for analysis in U.S. Department of Agriculture laboratories. In all, some 932 protein determinations were made on the second series of samples.

The third series consisted of wheat samples taken at random from 29 export vessels and 199 railcars, barges, and bins. The samples had been analyzed at FGIS' Portland field office laboratory as part of the field office's routine monitoring from December 1986 through the first week of April 1987. Protein content had been determined at the export elevators, and the field office analyzed the samples using both the NIR and Kjeldahl methods. A total of 768 protein determinations were made on these samples.

What the Study Found

On the average, the NIRs consistently gave protein results higher than the Kjeldahl results. The combined results of the three series representing 588 samples showed an average difference between origin-NIR readings and Kjeldahl readings of 0.27 percentage point. Specific results for each of the three series are as follows:

- For the first sample series, origin NIRs gave the highest average protein readings, followed by Quality Control Branch laboratory NIR readings, and lastly by Quality Control Branch laboratory Kjeldahl readings. The differences between the origin NIRs' results, i.e., the FGIS-certificated values, and the quality control laboratory Kjeldahl results averaged about 0.34 percentage point. The average difference between the Quality Control Branch laboratory NIR results and the Kjeldahl results was 0.19 percentage point.
- For the second sample series, study data showed that the average protein content for the origin NIRs (certificated value) was 0.36 percentage point higher than that for the Quality Control Branch laboratory Kjeldahl. The average protein content for the Quality Control Branch

laboratory NIR was 0.27 percentage point higher than that for the Quality Control Branch laboratory Kjeldahl. Further, Kjeldahl readings at destination of samples taken at origin and destination showed essentially the same readings, ruling out sampling as a source of differential readings.

- For the third sample series, data were analyzed separately for export and domestic samples. For the export samples, 61 percent showed NIR results that were 0.2 percentage point or more higher in protein than the Portland office's Kjeldahl results. About 50 percent of the domestic samples had NIR results that were 0.2 percentage point or more higher than the Kjeldahl results. In total, over 50 percent of the samples certified on the NIR gave protein readings averaging over 0.4 percentage point higher than the Kjeldahl results.

Action Taken as a Result of the Study

As a result of its study, in April 1987 FGIS adjusted its NIR instruments downward by 0.2 percentage point for Hard Red Spring wheat; thus, NIR protein readings now measure 0.2 percentage point less than before. According to an FGIS official, private industry (e.g., grain companies and elevators) uses the FGIS NIR calibration as the standard for their own NIRs. Thus, FGIS' action has had wide-ranging effects on producers of Hard Red Spring wheat.

In September 1987, FGIS completed a study to establish a new calibration equation for Hard Red Spring wheat. The NIRs will thus be recalibrated to reflect the 0.2-percentage point downward adjustment that has already taken place. According to FGIS officials, the NIRs will be recalibrated annually henceforth. FGIS believes such action is necessary in order for the NIRs to reflect any changes (e.g., new wheat varieties, farming practices) that might affect their accuracy.

Appendix II

Major Contributors to This Report

Resources, Community, and Economic Development Division Washington, D.C.

Brian P. Crowley, Senior Associate Director, (202) 275-5138
William E. Gahr, Associate Director
Jerilynn B. Hoy, Evaluator-in-Charge
Curtis P. Groves, Operations Research Analyst

Senator MELCHER. Congressman Marlenee.

Mr. MARLENEE. If I may pursue a line of questioning, first with Mr. Denning.

In April you received a set of reference samples that had been tested and calibrated by the FGIS in Kansas City; is that correct?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. In May you did not receive another set of samples that were to be used for calibration, but you received instructions to lower another 0.2 of a percent; is that correct?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. So in the first instance, you received a set of samples that were national reference samples, that had been tested by Federal Grain Inspection Service; but in the second case, in May, you simply received instructions to lower without another set of samples?

Mr. DENNING. Yes, sir. We received instructions to lower that set that we had received earlier; yes.

Mr. MARLENEE. That is an important point in this case. The first set of samples that you received in April, you ran through the machines in Montana to calibrate your machines, and they were calibrated exactly like the first set—like the April samples?

Mr. DENNING. The new national reference samples that you are talking about? They were run in conjunction with our old reference samples we had.

Mr. MARLENEE. Right.

Mr. DENNING. That was instructions to run them.

Mr. MARLENEE. And you calibrated the machines under those national reference samples?

Mr. DENNING. No. We didn't calibrate our machine—are you talking about prior to May 1?

Mr. MARLENEE. Yes.

Mr. DENNING. We ran the new national reference samples in conjunction with our old reference samples.

Mr. MARLENEE. Right.

Mr. DENNING. OK. Those results were called to Kansas City. Kansas City, in turn—that was after the April 14 lowering.

Mr. MARLENEE. Right.

Mr. DENNING. Those results were called to Kansas City. Kansas City called us back, I believe, on May 1, instructed us to go ahead and put them in use. May 4 is when they were going to go into use. And we proceeded to do it that way.

Mr. MARLENEE. All right. Now, in one case you received samples; another case, you received simply instructions to lower, and those instructions to lower came in May, May 1.

Mr. DENNING. May 4.

Mr. MARLENEE. May 4?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. It is my understanding—and I will ask Dr. Watson who is the head of the Kansas City Branch—that he was absent at the time that this order was issued.

Mr. DENNING. To my knowledge, that is what I have heard.

Mr. MARLENEE. You then subsequently, on June 15, after Dr. Watson returned and after there was some problem, received instructions to raise it by 0.1 of a percent; is that correct?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. On June 15 or thereabouts. And prior to that time, had you been told—you personally—had you been told by anyone in the FGIS that the second order to lower was in error?

Mr. DENNING. No, sir. I don't believe so.

Mr. MARLENEE. Nobody with the Federal Grain Inspection Service told you that the second order was in error?

Mr. DENNING. The first we had heard that was on June 15.

Mr. MARLENEE. On June 15 you heard that the second order was in error. Who told you that it was in error?

Mr. DENNING. My protein coordinator, sir, from Montana. The three conversations that had taken place on mentioning of an error was directly through him—or with him, from three separate people.

Mr. MARLENEE. Three separate people?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. Were those people LeRoy Baker, the Moscow, Idaho, field man for FGIS?

Mr. DENNING. Yes, sir. One of them, sir. Yes.

Mr. MARLENEE. Was the other one Bill Brookreson?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. From the State of Washington, and he stated that the second order was in error?

Mr. DENNING. Yes, sir.

Mr. MARLENEE. At what date? Approximately.

Mr. DENNING. That was on June 29, sir.

Mr. MARLENEE. Dr. Watson, the third one——

Mr. DENNING. Yes.

Mr. MARLENEE [continuing]. Head of the Inspection Service in Kansas City?

Mr. DENNING. That was also on June 29.

Mr. MARLENEE. June 29. Thank you. Now, they all stated that was in error, in a private conversation. Then you received instruction by Larry Zehm to raise it 0.1 of a percent—or prior to that time you had.

Mr. DENNING. Yes, sir.

Mr. MARLENEE. Did you request written confirmation by letter on raising it the 0.1 of a percent?

Mr. DENNING. Yes, sir, I did. That is part of the record.

Mr. MARLENEE. You requested, by letter, on raising it.

Mr. DENNING. That was on July 2, sir.

Mr. MARLENEE. And how were you responded to?

Mr. DENNING. I received a phone call from Larry Zehm and he stated that the instruction was given to him verbally, and he was instructed not to give any written verification on that matter.

Mr. MARLENEE. Did Mr. Zehm state why he would not supply written verification?

Mr. DENNING. No. But I am sure Mr. Zehm was following orders.

Mr. MARLENEE. Following orders. All right. If you were instructed to raise the basis 0.1 of 1 percent, wouldn't it be logical that you would make this information made publicly?

Mr. DENNING. Without a doubt. I mean if it wasn't a public matter, I mean if it was just part of the flow, I would never doubt that they wouldn't send it to us anyway, you know, anything in writing on any instruction.

Mr. **Marlenee**. And you received a communication that said we would not make it a public——

Mr. **Denning**. Yes, sir, we did.

Mr. **Marlenee**. Could you give me an approximate quote of that?

Mr. **Denning**. That they wouldn't——

Mr. **Marlenee**. Yes.

Mr. **Denning**. Just that he was instructed——his information was verbally, and he was instructed not to give any written verification on that matter.

Mr. **Marlenee**. What about the public announcement?

Mr. **Denning**. There wasn't any.

Mr. **Marlenee**. During this period between June 15 and August 1, with regard to the State of Washington, you took samples in Montana during this period, June 15 through August 1, based on a recalculation of up 0.1 of 1 percent?

Mr. **Denning**. Yes, sir.

Mr. **Marlenee**. Did the State of Washington samples, sample tests on producer wheat that was sent and subsequently tested in Washington, test lower than the State of Montana's?

Mr. **Denning**. We don't have ongoing comparisons. And that is one of our recommendations, to have an area-to-area samples sent out to indicate if there is a difference between them. We have no way of knowing. We are continuing—90 percent of our problems are protein-related. There is always minor problems in protein.

But we were told by Mr. Brookreson that they had not raised—from what I have heard, they raised sometime in August in Washington. But that has been an ongoing complaint; even at best, if you are trying to run a perfect program, you know, they are right out there, regardless, whatever, at the destination.

Mr. **Marlenee**. It would seem to me, Mr. Chairman, Mr. Senator, colleague, that a true evaluation of the June 15 through August 1 situation could occur if we could compare the tests that were taken in Montana on grain purchased, as to the tests at the destination or shipping point in the State of Washington, as to a comparison between those two tests. That would seem to be a logical extension.

I am taking more than my share of time, but I think I have established some information for the committee. I have one or two questions for Mr. Holt.

How many dollars of loss did you say that Montana producers had sustained?

Mr. **Holt**. We estimate somewhere in the neighborhood of $4 million, sir, during the last 6 months.

Mr. **Marlenee**. If, in fact, there is an error, do you feel that the Montana producers, particularly because the error resulted because of the Department of Agriculture making an erroneous lowering, do you think that the Montana producers should be reimbursed or made whole for that error?

Mr. **Holt**. Yes, sir, we do. And particularly, in light of the fact that they fully knew that for at least a 6-week period, Montana grain was being graded 0.1 of 1 percent higher than the destination grade. So they knew, without a doubt, that there was at least a 0.1

difference in protein between Montana and grain being exported out of the State of Washington, and that situation was not dealt with correctly or forthrightly.

Our lab was told that when the June 15 change was made, that that was being made unilaterally across the Nation, and that was not correct. In light of this, and the attempts to cover up this whole incident, we feel that reparations are in order.

Mr. MARLENEE. Thank you.

Two questions for Mr. Kelly, Senator—and welcome to the committee, by the way.

On October 6, I have in my possession a letter written by you. Could you tell me to whom it was addressed?

Mr. KELLY. Yes. Congressman Marlenee, I wrote a letter to Kirk Miller on October 6 pertaining to the subject that we wanted an answer why we couldn't get in writing when we were verbally told to raise the baseline values up 0.1. We wanted it in writing, we wanted it verified.

Mr. MARLENEE. This was on October 6?

Mr. KELLY. That is correct.

Mr. MARLENEE. Do you have in your possession a letter from myself to Richard Lyng, Secretary of Agriculture?

Mr. KELLY. I do not; but I am aware that there was a letter sent to the Secretary.

Mr. MARLENEE. On October 28?

Mr. KELLY. That is correct. About that time.

Mr. MARLENEE. When were you responded to by Mr. Miller?

Mr. KELLY. On October 30 a response from Mr. Miller came back to myself, explaining the first part of my question but not the basic part of your October 6 letter.

Mr. MARLENEE. So in that letter, he discussed the original reduction?

Mr. KELLY. That is correct.

Mr. MARLENEE. But nothing about the potential error?

Mr. KELLY. Not a thing about it.

Mr. MARLENEE. And you had made specific requests——

Mr. KELLY. That is correct.

Mr. MARLENEE [continuing]. For information on the error, or the potential error?

Mr. KELLY. That is what we wanted to know in our October 6 letter, yes.

Mr. MARLENEE. In your management of the Department of Agriculture in Montana, is that type of information essential?

Mr. KELLY. Congressman Marlenee, yes, it is, because I guess to have confidence with our grain lab, we have got to make sure we've got documentation. And I don't want Rex or any of those employees up there tinkering with these protein analyzers because there is always somebody questioning. To somebody, a 0.1 of a protein can mean a lot of money to people. So it absolutely—I have insisted that it has got to be in writing if we are going to adjust the machines.

Mr. MARLENEE. Mr. Chairman, Senator, I appreciate the time extended to me. I apologize for taking so long, but these were important witnesses, and I thank them for appearing.

Senator **Melcher**. Your questions were very important, I believe, for the record.

Mr. Denning, we have a situation where the moisture content is adjusted, and then they further address the question of lowering and raising the protein. What is the best term for that—protein what, the 0.2 and the 0.1?

Mr. **Denning**. Protein—you mean on the machines?

Senator **Melcher**. Yes.

Mr. **Denning**. Protein biases.

Senator **Melcher**. Protein biases. So we have that going on during a period of 2 months, 3 months, 2½ months, several different changes. In your experience in grain inspection, which is substantial—you told us 25 years as a grain inspector—have you had other incidents like that, where you had so many changes in 2 or 3 months?

Mr. **Denning**. Nothing that indicated the magnitude of this, to my knowledge, ever.

Senator **Melcher**. So this is your first experience with that many changes back and forth?

Mr. **Denning**. That weren't acceptable?

Senator **Melcher**. And during that period of time.

Mr. **Denning**. That weren't acceptable or totally understandable?

Senator **Melcher**. Well, I don't know. I'll let you phrase it.

Mr. **Denning**. Well, they weren't totally acceptable and totally understandable, yes. Like I say, this scared me.

Senator **Melcher**. Then, second, there were some written directions; oral directions may have been given first but were followed up by written confirmation. The fact that there were some that were given written confirmation and there are others which were not given written confirmation, is the second point that is different about this whole scenario; is that correct?

Mr. **Denning**. That is correct, sir. And never before, to my knowledge, have we ever requested written confirmation on anything. That has never happened either until this time.

Senator **Melcher**. What do you mean by that?

Mr. **Denning**. I've never——

Senator **Melcher**. In other words, you didn't have to request written confirmation; it just automatically followed?

Mr. **Denning**. Generally.

Senator **Melcher**. Within a day or two?

Mr. **Denning**. Yes, sir.

Senator **Melcher**. So in this instance, you requested written confirmation on at least one occasion. Were there more occasions?

Mr. **Denning**. No, sir.

Senator **Melcher**. Just one?

Mr. **Denning**. One time.

Senator **Melcher**. You were told there wasn't going to be, and it wasn't to be made public?

Mr. **Denning**. Yes, sir.

Mr. **Marlenee**. Will the Senator yield?

Senator **Melcher**. Yes.

Mr. **Marlenee**. I think this is an important point, and I appreciate my colleague yielding.

You said—if I may quote you from your previous statement—you said that never in your 25 years, in your experiences working with USDA, have you ever been denied a written confirmation.

Mr. **Denning**. Sir, we probably never asked for one, either. I mean I want to make that clear.

Mr. **Marlenee**. Yes, of course.

Mr. **Denning**. And we never were denied one. We never have asked for one, to my knowledge.

Mr. **Marlenee**. But you would find it unusual?

Mr. **Denning**. Terribly unusual.

Mr. **Marlenee**. Thank you.

I will turn it back to my colleague.

Senator **Melcher**. You did not get that written confirmation within a matter of days, and you were instructed at the time you requested a written confirmation, which I assume is about 2 weeks later; is that about the time lapse?

Mr. **Denning**. Yes, sir.

Senator **Melcher**. And you were told that there wasn't going to be any written confirmation, and that it was not to be made public. Is that when you felt shaky? That's your term, "shaky."

Mr. **Denning**. Sir, prior to that we had heard that there was an error made on May 4, 1987. We had heard that also. And we were just in the process of building this thing, like—

Senator **Melcher**. I want to get at how you felt. You said you felt shaky. What does that mean?

Mr. **Denning**. That means that this is the first time an incident ever happened in my life——

Senator **Melcher**. Does it mean you are scared?

Mr. **Denning**. I'm not scared, no. I am just nervous, see, or whatever.

Senator **Melcher**. Nervous. Are you nervous because you think there is something going on that's dishonest?

Mr. **Denning**. I have to act on anything—you know, if a person suspects anything, I have to report to my Department of Agriculture. We are supervised by two departments, two Government bodies, Federal Grain Inspection and the Montana Department of Agriculture. And with those two involved, there is only one way to operate, and you have to operate 100 percent as accurate as possible. And when we were refused, and we had heard errors made, and were refused written confirmation, that indicates one thing.

Senator **Melcher**. What?

Mr. **Denning**. That somebody evidently is trying to cover some kind of an error up.

Senator **Melcher**. Is that dishonest?

Mr. **Denning**. Yes, it is. To my knowledge.

Senator **Melcher**. It certainly is.

Mr. **Denning**. It certainly is.

Senator **Melcher**. I don't carry around these citations in my head, but are you aware of 41 U.S.C. 3101 which says to make a record of all decisions and maintain written records?

Mr. **Denning**. No, I am not, sir.

Senator **Melcher**. One final question. In your judgment, did the farmers lose?

Mr. **Denning**. Yes, sir.

Senator MELCHER. Is the amount that Gregg Holt cited about the amount they lost?

Mr. DENNING. I would have confidence in that, but I would like to make another comparison, if I may.

Senator MELCHER. Please do.

Mr. DENNING. We have calculated out—my protein coordinator, like I mentioned, is as competent as anybody alive——

Senator MELCHER. And that is Mr. Williams?

Mr. DENNING. Yes, sir. And you calculate out a 52-car unit train at a 14 percent protein level, and you take one-quarter away from that, at rates that the premiums we have been seeing, you are looking at a $30,000 loss on one train. So yes, sir, it is substantial. You calculate 0.1 or 0.2 out in dollars on a particular lot of grain, you're talking an awful lot of money.

Senator MELCHER. Thank you.

Mr. DENNING. Yes, sir.

Senator MELCHER. Chairman Glickman.

Mr. GLICKMAN. Has Mr. Marlenee been——

Senator MELCHER. Yes, he has.

Mr. GLICKMAN. Thank you.

I want to ask you what I call "macro" questions first. But I want to get to this question of dishonesty. Following this up, do you believe that a crime has been committed here by anybody?

Mr. DENNING. I believe there has been an error made and it wasn't corrected properly.

Mr. GLICKMAN. So somebody was covering up for their own mistakes at a certain high level?

Mr. DENNING. That is what I have been told.

Mr. GLICKMAN. By whom?

Mr. DENNING. By a protein coordinator.

Mr. GLICKMAN. Who is located where?

Mr. DENNING. He is the assistant at the official agency in Great Falls. Three conversations took place with him. I was never told by anybody in FGIS or anybody else that there had been an error. This all come from him. During this particular time, I was on vacation, or at school or somewhere, but him and I are both mentioned here. He is our protein coordinator; he takes care of all the protein problems. And, like I mentioned, 90 percent of our problems in grain inspection are protein. There's so much money involved in it.

Mr. GLICKMAN. So your protein coordinator, though, told you that somebody had been covering up. Who had been covering up?

Mr. DENNING. He told me there was an error made, and that the individual wanted to correct it and was denied.

Mr. GLICKMAN. The individual was where?

Mr. DENNING. The individual—what he told me, was Dr. Watson.

Mr. GLICKMAN. Have you ever been able to confirm this?

Mr. DENNING. No, sir, I have not. I have never heard of a Federal—like I say, I have never heard of FGIS ever mentioning it to me.

Mr. GLICKMAN. OK. Now, going away for a moment from the issue that you raise, I want to talk for a second about the issue of the general policy of changing the computations because I am reading from Winston Wilson's statement, and he will be the next witness on this panel. He talks about the export problems on protein.

Then he says, "I will say that, from our viewpoint, the FGIS did take some action to correct this situation," that is the protein testing procedure, "and that since these actions have been taken, complaints of protein discrepancies from Asia have almost totally disappeared. Consequently, U.S. wheat farmers have managed to hang onto these very important markets which were for a period late last year and early this year in severe jeopardy. In fact, as a result of these actions, FGIS's actions, we believe that our market share in the Malaysian market will increase significantly over the next 2 years."

Now, I am not here to defend the FGIS. But I am here to determine if they were trying to do something to pursue a bona fide public policy objective of this country, and that had to do with protein discrepancies, and were they going down the right road or going down the wrong road. I wonder if you would comment on what Mr. Wilson says, Mr. Holt.

Mr. HOLT. Congressman, I would like to comment on that. I would certainly agree, to a certain extent, with the comments that you referred to from Winston Wilson, although I have not read his prepared testimony. As I indicated early in my testimony, we have no argument with this adjustment of the 0.2 downward. If our grain is not moving, if it is being improperly graded, then we are willing to make that adjustment even though it means a significant amount to the producer to have that adjustment occur. That is really not the issue here. It is a totally separate issue.

I would say, from everything that I have heard, that some very positive things have been happening in the FGIS, as far as grain grading, as far as protein, in the last several years. We are not taking issue with those; in fact, we commend them for many of the improvements that have been made in that whole area of grain grading, protein grading. There is certainly a lot of room for improvement.

What we are really questioning here is what appears to be an error and the subsequent efforts to conceal that error from the general public and cover it up. That is the thing that really bothers us. I mean if the error had been made and corrected as soon as it had been discovered, I think you would find the farmers of this Nation to be probably still a little mad but somewhat understanding. When obvious errors have been made and obvious attempts to cover up those errors, I think that needs to be corrected, and fast.

Mr. MARLENEE. Would the chairman of the subcommittee yield?

Mr. GLICKMAN. Sure.

Mr. MARLENEE. Of course, we don't disagree with the proper calibration, and that took place in our opinion, and I am speaking for Montana producers and protein producers, in general, across the Nation. That took place with the original April 0.2 percent downward adjustment. However, if there was an error of an additional 0.2 percent, of course our buyers are going to smile all the way to the bank, and we have a bonus commodity program, using the gold dust to protein, taken out of the pockets of the producer. And that is the question.

Mr. GLICKMAN. Mr. Kelly.

Mr. KELLY. Yes. Representative Glickman, the periods here, I think that for several years—the customer is always right, and if we are out of sync with the rest of the world selling our grain, then we ought to get back online. If adjustments need to be made, that's fine, do it. And FGIS ought to be commended for moving on them.

What, perhaps, may have happened, and I am standing from a distance back, but several adjustments and activities are taking place in a very short period of time, and maybe we're getting ahead of our headlights. We're just moving a little too fast.

Mr. GLICKMAN. Let me ask you this. Do you think that there was an intentional overadjustment by FGIS? Mr. Holt is shaking his head no. But go ahead and answer my question, Mr. Kelly.

Mr. KELLY. Personally, I don't think so. It may have been an honest mistake, and you try and correct an honest mistake. But I don't know.

Mr. GLICKMAN. Mr. Holt.

Mr. HOLT. We think it probably was an honest error on somebody's part in FGIS.

Mr. GLICKMAN. So it wasn't part of any broad scheme to try to sell more grain cheaper just by overadjusting the protein content?

Mr. HOLT. We certainly don't believe so. But not knowing the circumstances, we don't know. But it does look like that there was a conscientious—or conscious action taken to cover up that error, and that is what bothers us.

Mr. GLICKMAN. Mr. Denning.

Mr. DENNING. No, sir, I don't believe there was a scheme to try to sell more grain cheaper just by overadjusting the protein content. I do believe there was an honest error and an effort to cover it up.

Mr. GLICKMAN. One final question. Just curiously, in these kind of circumstances, when you adjust protein content down and, therefore, you prejudice the producer of it, do you think there ought to be some form of Federal indemnity program to pay for the loss when the Government makes an arbitrary judgment, or makes a decision to so-call make us more competitive? After all, we have done that in our farm bill of 1985, we have adjusted prices down to be more competitive, and we make up the difference in a target price system.

Do you think the same thing, maybe, is true, for example a protein content or other kinds of grain quality issues where producers may be prejudiced by the need to make changes to deal with the world? I'm just asking the question, just hypothetically, should Uncle Sam make up that difference?

Mr. HOLT. It's an interesting thought, but probably impractical, just in terms of administration. I don't think that that's what the farmers of the world, at least the United States, are looking for. We want a fair, accurate and honest evaluation of our grain, and we want no more or no less than the quality that grain reflects. And we rely heavily on the Federal Grain Inspection Service to ensure that the quality at which our grain is purchased is, in fact, accurate—not only accurate in Great Falls, Montana, but accurate in Bangkok, or wherever that grain is sold.

Mr. GLICKMAN. Let me ask one final question. Have you talked to your lawyers, if you have lawyers—there are plenty around in this country—to determine if you could file suit against the Government for negligence, either in some sort of class action or some sort of personal lawsuit?

Mr. HOLT. We have not consulted an attorney at this time, although at the board meeting of the Montana Grain Growers, it was at least suggested that might be a possible course of action. But we chose, first, to go the hearing route through our Representatives, Congressmen and Senators here, to determine what actually had transpired.

Mr. KELLY. As far as an agency, Representative Glickman, we consulted—I did consult with the Agency lawyer, my lawyer for the Department, and this was the appropriate response to do it. We would probably be a part and party to that suit because we are in a cooperative relationship with FGIS in this whole matter.

Mr. GLICKMAN. OK. I notice—just a final comment—in Mr. Miller's statement, on page 4, he says, "However, to assure an impartial review, the Assistant Secretary for Marketing and Inspection Services has requested the Inspector General" of the Department of Agriculture "to conduct a review of this protein testing program."

Were you involved at all in that decision by the IG to look into this, and do you know anything about it?

Mr. HOLT. No. We had heard that that had been initiated, but I have not seen Mr. Miller's prepared testimony, so I can't really speak to that.

Mr. GLICKMAN. Thank you.

Mr. MARLENEE. Would the gentleman yield?

Mr. GLICKMAN. I will be glad to yield.

Mr. MARLENEE. It was done at the request of myself and the Senator.

Mr. GLICKMAN. Thank you very much, Mr. Chairman.

Senator MELCHER. Mr. English, we are glad to have you here. Do you have any questions for these witnesses?

Mr. ENGLISH. Not at this time, Mr. Chairman.

Senator MELCHER. Thank you.

Mr. MARLENEE. Mr. Chairman.

Senator MELCHER. Yes, sir.

Mr. MARLENEE. There was a reference made to attorneys, and I note there are two farmers and a veterinarian, and I don't recall the profession of the other member at the table.

Mr. GLICKMAN. Let's just say for the record that neither one of us are veterinarians.

Senator MELCHER. Well, that does narrow it down, doesn't it.

I want to thank you very much, Gregg Holt, and the Montana Grain Growers; Keith Kelly and Department of Agriculture in Montana; and Rex Denning, I want to thank you for being here and for very forthrightly laying out a most disturbing and a most damaging set of facts. Thank you all very much.

Our next witness is William Brookreson, State of Washington, Department of Agriculture, in the Grain and Commodity Inspection Service. Mr. Brookreson.

Mr. Brookreson, I read your complete prepared testimony last night, and I want to thank you for providing it to us. It is one of the most instructive documents on what is involved in grain inspection regarding protein analysis. I hope you can summarize from it. The entire prepared testimony will be made part of the record.

STATEMENT OF WILLIAM E. BROOKRESON, GRAIN INSPECTION PROGRAM MANAGER, STATE OF WASHINGTON, DEPARTMENT OF AGRICULTURE, GRAIN AND COMMODITY INSPECTION SERVICE, OLYMPIA, WA

Mr. BROOKRESON. Thank you, Mr. Chairman. Thank you for the opportunity to be here and to testify in this matter. For the record, my name is William E. Brookreson, and I am the Grain Inspection Program Manager for the Department of Agriculture, State of Washington.

The State of Washington is both a delegated and a designated State. We have eight inspection offices, including four export, and we supervise five major export elevators. Protein for us is a very important part of our export program. In our last fiscal year, 1986–87, we performed 44,291 protein determinations.

We have a little bit different arrangement than the State of Montana because we have entered into a Federal/State cooperative agreement where the State of Washington actually supervises the protein program directly, in the way that the Moscow field office does for the State of Montana. And our protein coordinator, Mr. Arthur Choate assisted in preparing the testimony and Lloyd Brown, who is our Federal Manager, reviewed this testimony with me to make sure that everything was as accurate as we can reconstruct it.

Our quality control program revolves, as you are aware, around a set of standard reference samples, and these reference samples allow us to rebias a protein instrument when we have problems with drift or when we have operators that don't compare to these reference samples. They are the way we standardize the program from office to office, from area to area, and from day to day. It is very important for us that these samples be very consistent in their value because they determine, basically, the value at which grain is traded.

As I said in my prepared testimony, and I won't recount most of that, we began to experience problems with bias changes from the quality control branch in Kansas City late in 1985, what we considered rather significant changes, and we went through a rather long process of trying to resolve these. It is all detailed in there with a number of attachments. We were trying to establish a stable baseline value.

As a result of that, by September 1985, we had moved up from where we had been in 1984, at various times we were probably 0.3 higher than we were in 1984. We don't have any way to determine what is the absolutely correct protein value. We don't run Kjeldahl. Our whole program revolves around trying to maintain stable protein values. I think you have a number of figures in the prepared statement that show where we had moved at the time.

So we felt and, at a number of meetings, expressed concern that we were higher than we should have been on the baseline values, that we were higher than we had traditionally been. We had some very serious concerns about a growing number of foreign quality complaints that were conveyed to us through the exporters we deal with, through U.S. Wheat Associates, through a number of foreign trade teams, and through the Japanese traders in Portland, and we conveyed those concerns to FGIS a number of times. I think you have minutes of meetings where we do that.

In 1987 there were a number of steps taken that we thought were quite appropriate to deal with this problem. Procedurally, we have a set of instructions out now that has a standardized procedure nationwide. This is something we hadn't had for a number of years, and we think that has had a very good effect on the overall program.

We went to the 12 percent moisture basis, as everyone is aware of, in May 1987 and that was the source of a great deal of confusion. We didn't do a very good job of conveying to the trade, especially the producer level, exactly what the impact of that was going to be.

One of the major steps we took in 1987 was to put out a set of national reference samples so that every office that runs protein wheat was using the same standard of reference samples to bias the machine and allow you to compare one instrument with another.

Prior to 1985, really, the program was a series of very local programs, with a set of reference samples set up by a field office with stacking built into the system. The field office maintained a standard instrument. Then you compared the field standard to Kansas City. It was a very inefficient system.

Beginning in 1986 and going into 1987, in the State of Washington we developed one set of reference samples that were used in Washington, Oregon and Montana—through the Moscow circuit—and we had an entire grain flow covered. With this change in 1987, we had a national set where we could compare instruments with one another.

Part of that process was that in March, I believe, these reference samples were sent out to the offices. And in line with the instructions that were given, each office ran this set of new reference samples to determine where you were compared to the reference samples you were using at the time. When we ran the samples, our bias, based on an average of 10 reference samples, was 15.23. We ran those samples, and it indicated—I have the figures in here—that to go to the new reference samples would have required—I believe it is 0.09 biasing down. We were about one-tenth off. To go from the old samples to the new and stay at the baseline figure, we would have had to bias about 0.1.

Well, subsequent to that, as has come out here, on April 15 we received notification that the value of our Spring wheat reference samples—and at this time it was the set we were using that were developed in 1985—was being lowered by 0.2 of 1 percent. That is a linear reduction, so it dropped protein values that were certificated by 0.2 of a percent. We went to 15.03.

Later, we received notification that the new standard reference samples were also being dropped, and we received, on May 9, a telemail communication from Dr. Watson officially dropping those values from 13.89 to 13.69. On June 15, Lloyd Brown, who is our Federal Manager in Olympia in our Federal/State cooperative agreement, was notified by Ron Bicsak, the Quality Control Branch at Kansas City, by telephone that we were to operate our instruments 0.1 above the baseline figure.

That is a little different than I think the instructions that were conveyed to Montana, where they were told to raise the bias by 0.1. We were told to operate at 0.1 above the baseline figure. We asked for confirmation, and we were told that Mr. Bicsak would get back to us. We later got information that there would be no confirmation forthcoming.

As the manager of the program, I took very strong exception to this particular procedure, from a couple of standpoints. The most important to me was that in May we had put out a new set of procedures and in that procedure, to me, it spells out very clearly that the instruments are always to be biased at the baseline figure, and we regarded this as a key part of a national program. We felt that any instruction that violated that, especially an instruction that was an oral instruction, was such that we couldn't give to our field people, in all good conscience, and have them do that.

We conveyed those concerns to FGIS management in a conference phone call on, I believe, June 19, and again in a meeting in Portland on June 24 with the administrator.

Mr. **Marlenee**. What date?

Mr. **Brookreson**. June 24 I believe is the date I have here, in Portland, Oregon.

We were also concerned that by not putting out a written instruction, we would create, at least an appearance of something beneath the boards. And it has been our experience that whether you put out written instructions or not, that everybody in the trade is immediately aware of any protein changes. I guess we were alarmed in a different sort of way than Mr. Denning. It was our belief that whatever happens in protein, everybody is immediately aware of, who deals in protein, because of the economic significance of it.

At these meetings, we specifically asked if, indeed, that change was a change in the baseline figure from 13.69 to 13.79. We were told, no, it was not a specific change in the baseline figure. We asked for specific instructions, and they weren't forthcoming.

Mr. **Marlenee**. And what? Pardon?

Mr. **Brookreson**. No instructions were forthcoming in that regard.

Mr. **Marlenee**. And this was a second request, sir, for instructions?

Mr. **Brookreson**. It was a followup to the conference call; basically, all one set of events.

We remained at the baseline figures the instructions say to do. All our instruments were biased to the baseline. In July, it became apparent that Kansas City had raised their baseline figure by 0.1, because we were consistently being 0.1 below grain coming into our market. At that point, we decided that we couldn't operate in that sort of way because we had clear evidence that we were one-tenth lower than the rest of the market. So we issued out written instructions to our field office people to raise the bias from 13.69 to 13.79, and you have a copy of my memo to them attached. I felt that was the only way that we could do it.

From that point on, I think, as far as we can tell, that bias adjustment was probably appropriate. It took us very close to where we were at the time the bias was lowered to 15.02. There were a number of changes taking place, so it is difficult to track all the figures through. I did as good a job as I could in the prepared statement to do that for you.

Our concern wasn't with the bias adjustment, as I say, because I think that was an appropriate adjustment. Our concern was with the way it was done. We didn't think that was a sound way to do it. And I haven't changed my opinion on that particular item.

From that point, I would say the National Protein Program, as we see it—and we are very deeply involved with it, as Chairman of the AAGIWA, the American Association of Grain Inspection and Weighing Agencies Protein Committee, and as manager of the largest non-Federal agency dealing with grain exports. We think the program is working well now. We haven't seen the foreign quality complaints. It looks like we line up very well all the way through this system. Our latest appeals and board appeals look as if we are very, very close to where we ought to be.

We are concerned at this point that the calibration study hasn't been completed. I understand it is soon to be released. It has been our feeling that at least since January 1986 when we were in Washington, DC, that current calibration constants probably have some error in them. We don't know how much it is, but we have some figures that our people developed that makes it appear to us that they are not as robust as they ought to be. We think that at the time the new calibration constants come out, there may be some minor biasing that has to be done. But we think that would be the appropriate time to do it.

I guess with that, that is a quick summary of what I have. There is a great deal of detail there, and I will be happy to try to answer any questions you might have.

[The prepared statement of Mr. Brookreson follows:]

November 4, 1987

Members of the Committee:

My name is William E. Brookreson. I am the Grain Inspection Program Manager of the Grain and Commodity Inspection Service of the Washington State Department of Agriculture. Our office is at 2728 Westmoor Ct., Suite B; Olympia, Washington 98502. At the present time, I also serve as the Treasurer of the American Association of Grain Inspection and Weighing Agencies (A.A.G.I.W.A.) and as chairman of the Grades Committee and the Protein Committee for that organization.

I. Background:

The state of Washington is both delegated and designated to provide official inspection, weighing and related services under the United States Grain Standards Act within the geographic boundaries of the state. Currently we employee 90 permanent inspection personnel and hourly help as needed to provide this service. We provide that service through four offices at export locations (Seattle, Tacoma, Kalama and Vancouver) and three designated inland offices (Spokane, Colfax and Pasco). Quality control functions are performed through a supervision laboratory located in Olympia and staffed by three state and two Federal Grain Inspection Service employees.

Among the most important services we provide to the grain industry, both export and domestic, is official protein determinations using Near Infrared (NIR) technology. We have provided official protein determinations since 1976. The state of Washington was one of the first agencies to use NIR technology. In our 1986/87 fiscal year, we performed 44,291 official protein determinations. Protein determination on wheat is an important part of the program through Washington export elevators and is becoming an increasingly important part of the production within the state. Because of this, the recent changes within the program, most particularly the change to the 12% moisture basis, have been the object of a great deal of concern among Washington producers.

Because of the economic importance of protein to the Washington wheat industry, we are deeply concerned with the accuracy and consistency of protein determinations. To assure that accuracy, an elaborate system of quality control has been developed. Our quality control program is somewhat unique because of a cooperative agreement with F.G.I.S. entered into by the states of Washington and California in 1984. By the terms of these agreements, these states assumed the responsibility for most of the supervision and quality control performed by the F.G.I.S. field offices in other areas. As the state program manager, I work closely with our Federal Manager, E. Lloyd Brown, to assure the smooth functioning of a quality insurance laboratory and program. I will briefly review the process we follow with NIR protein testing program.

The pivotal role in that process is played by the Quality Control Branch (QCB) of the Federal Grain Inspection Service in Kansas City. QCB maintains the standard Kjeldahl instrument against which all the NIR instruments used for official protein determinations are calibrated. This unit is the standard for the national program and the values it provides define what protein is for purposes of official inspection. The rest of the standardization program is really aimed at providing consistency. The Kjeldahl, in terms of timeliness, was not practical to meet the needs in on-line determination of protein values at modern, high speed, export facilities. For this reason, the NIR instruments were developed to provide rapid, low cost, protein analysis. These instruments were standardized by means of a collaborative study which resulted in a set of calibration constants for the classes Hard Red Spring, Hard Red Winter, White Wheat, Soft Red Winter, and Durum. These constants provided for the best repetition of Kjeldahl values for the greatest number of samples. A small number of samples and varieties do not predict well on the NIR instruments as a result. The calibrations need to be periodically reviewed, and updated if needed, to maintain the best predictability with changes in varieties and growing conditions.

The NIR instruments are subject to an electronic "drift" or change in bias. To deal with this problem, instrument stability is checked daily prior to making any official protein determinations by means of a set of Standard Reference Samples (SRS) for each class of wheat. These Standard Reference Samples consist of samples of wheat whose protein value has been established by a number of runs on the standard Kjeldahl unit at QCB. These represent samples throughout the range of protein to be tested. We are currently using a set of national reference samples provided by QCB. Prior to May 1987, the state of Washington provided reference samples used throughout the Pacific Northwest and as far east as Montana. These samples were carefully selected from the farm sight by our inspection personnel for homogeneity, varietal purity, freedom from damage and foreign material and repeatability on the NIR instruments. The samples were cleaned, standardized with the Kjeldahl, and stored under controlled environmental conditions to maintain repeatability and integrity.

These SRS samples are central to the proper functioning of the system. Once the value has been established by QCB, these samples are used to assure that the results remain as constant and predictable as possible. The quality of these samples is absolutely critical to the operation of a truly national system because they provide us a known baseline to compare operators and instruments. They provide the means to determine if the instrument is predicting the same protein value from day to day and to make the necessary adjustments so that values are constant. Because individual samples can be expected to vary, an average of ten sample values is used to establish the instruments operating values. That average is compared against a baseline value, the average of the known values of the ten SRS samples. The allowable deviation from that baseline is ± .15%. If that is exceeded, the instrument is electronically readjusted, or rebiased, to again predict as close to the baseline as possible. We also rebias the instrument if it is consistently on either side of the baseline. After biasing, the instrument is rechecked using the Standard Reference Samples to assure that it is within tolerance before any official determinations are made.

Within the inspection laboratories, a number of other measures are taken to achieve accurate results. Instruments are on dedicated electrical circuits with voltage regulators to insure constant voltage. Temperature and humidity are monitored and controlled. Dust is controlled. Smoking is not allowed near the NIR instruments. Grinding rings and screens in the UDY grinders, used to prepare the samples, are regularly changed. All equipment, techniques and procedures are carefully defined and controlled. All operators undergo an extensive training process and are examined and licensed before they are allowed to make official protein determinations. Their daily work is checked regularly by means of a system of monitor samples submitted both to our Quality Assurance Laboratory in Olympia and to QCB in Kansas City. When problems are found, we take necessary corrective measures up to and including removing operators from the program. By experience, we have found that the process is very sensitive to technique of individual operators and, as a result, we strictly limit the number of people allowed to make official protein determinations.

Within the state of Washington, we have established a protein specialist job classification to control who is involved in official determinations. Our statewide program is directed by our protein coordinator, Arthur Choate, whose job is to train and monitor the work of all our operators and to work closely with QCB to maintain the quality of the program. Art's responsibility is to assure that information is conveyed quickly to the field and that any problems are corrected as quickly as possible. He is in daily contact with each of our operators and is available to go to individual field offices, if needed, to assist in solving problems. Art Choate has been involved in NIR protein since 1976. That continuity and experience is an important part of the stability of our program. Many of our specialists in the field are also long term in the program.

In the state of Washington, we are currently using the Instalab 800 protein instrument manufactured by Dickey-John Corporation interfaced with an HP-85 computer. These are, in our opinion, as good an instrument as we can acquire. They also compare very closely with the Technicon instruments used by FGIS. These machines are equipped with internal diagnostics to detect and identify problems. These instruments have a capacity of 100 products which has allowed us to put individual technicians in their own "slots" within the computer. The advantage of this is that it allows us to bias out small individual operator differences and provide the most accurate results for each operator for each product.

In summary, the goal is to control as many variables as possible. There are five with which we are most concerned.

1. The sample. No two samples are absolutely alike because wheat is not perfectly homogeneous. As a result, there will always be some variation among cuts of the same sample of wheat, no matter how carefully technique and other factors are controlled. In dealing with the reference samples, it is critical that the sample be as homogeneous as can be obtained because variation here will impact how the instrument is biased.

2. Operator. The operator technique and procedure are carefully laid out in instruction, Book V of the "Grain Inspection Handbook". In spite of this, there are subtle differences in technique that will cause the "bias" differences between operators on the same instrument. The SRS samples enable each operator to adjust the instrument to compensate for these individual differences.

3. The UDY grinder. Samples have to be ground into flour using an UDY grinder to make official protein determinations. Because the sample is heated in the rapid grinding process, there is a loss of moisture. It is critical that this loss be as uniform and predictable as possible. For this reason, the grinder is "warmed up" and the feed rate of the sample is controlled using an autofeed. Grinder abrasive rings and screens that determine the rate the sample is prepared and the particle size of the flour are regularly changed. (Variation in particle size also strongly impacts the accuracy of NIR protein.) Care must also be taken to prevent cross contamination of samples by regular cleaning of the grinding chamber.

4. Moisture. The change to the fixed moisture basis has reduced this problem considerably since the determination of protein percentage is now based on a 12% moisture basis. Moisture results from the Motemco moisture meter are no longer a part of the protein equation. The problem of maintaining the moisture of the ground sample remains.

5. Instrument variation. The NIR is an electronic device subject to power source and other environmental conditions that may cause instability or "drift." These sources of variation are controlled, as much as possible, and the electronic drift of the instrument is monitored and controlled by the use of the SRS samples.

II. The Hard Red Spring Wheat bias issue.

As Program Manager for an agency involved heavily in the export of protein wheat, I have been concerned with protein issues. The protein program, although it was national in theory, was run until 1985, as a series of local programs with on-line instruments standardized against an instrument in an F.G.I.S. field office that served as the standard for an area. That F.G.I.S. office standard was aligned with the agency's standard instrument in Kansas City. Reference samples were obtained, prepared and distributed within an F.G.I.S. circuit. There were problems of erratic quality of these samples, methodology, training of personnel and the stacking of tolerances within the system.

Prior to 1984 when the state of Washington entered into the Federal/State cooperative agreement, protein for our inland offices was supervised out of the Moscow field office, for Seattle and Tacoma out of the Seattle field office and for Longview, Kalama and Vancouver out of Portland. We were aware of significant differences between areas - most especially between the inland and export locations. In 1984, we initiated an informal exchange program within the state using a set of reference samples we obtained, with help from the state of Montana, for Hard Red Winter and Hard Red Spring Wheat. When we entered into the Federal/State agreement and all supervision for Washington offices was transferred to Olympia, we already had a monitoring program in place and operating. This was formalized by a set of "Interim Procedures for the States of Washington and California" which served as the basic instruction for our program until the issuance of Book V.

The initial program worked relatively smoothly. In order to remove the "bias" stacking in the system, we used the QCTB values for the baseline of the field instruments and biased instruments to within ±0.15 of that baseline. The only problem we had was a tendency for the QCTB baseline to go up in winter and down in the summer. As an example; on Hard Red Spring Wheat our baseline, on the same samples, was given as follows:

07/23/84	15.11	baseline
02/07/85	15.22	(+ .11)
07/08/85	15.09	(- .13)

In late 1985 we began to experience increasingly significant changes in values from QCTB. In May 1985 we first became concerned about inconsistent Kjeldahl values we were receiving from QCTB. In one two week period, we received five different averages for our SRS samples.

In May 1985, we met with Portland F.G.I.S. and decided to establish a set of common SRS samples for the Portland, Moscow and Olympia circuits that would cover the bulk of the grain flow to the Pacific Northwest. In August, Art Choate and John Flemm, F.G.I.S. Quality Assurance Specialist in Olympia, went to Montana for the sole purpose of hand selecting a new set of SRS samples to replace our depleted supply. John Flemm, a former member of the Board of Appeals and Reviews in Kansas City, examined the samples for varietal purity, freedom from damage and foreign material and overall quality. These samples were brought to Olympia, cleaned and distributed. Our problems with obtaining consistent Kjeldahl values from QCTB became very obvious in establishing baseline values for this set of reference samples. We were given an average value of 14.97 on the ten reference samples November 5, 1985. The Portland Field Office, which also has a Kjeldahl unit, reported 14.94 on the same samples. The 14.97 Kjeldahl value required no rebias of the NIR instruments which were set with our 1984 samples. It appeared as if the transition would be very smooth. At the same time, we were receiving unit trains from the Minot, North Dakota area and finding differences of 0.5% or more between origin and destination proteins. Board appeal protein values on these cars were consistently higher than we determined in Olympia. On November 20, we received a new value of 15.38 on the same SRS samples (previously 14.97). When we submitted another set of our 1984 SRS samples to QCTB, we found that these values were considerably higher than their established baseline. At that point, Lloyd Brown, the Federal Manager in Olympia and I, questioned why the protein values had changed and repeatedly asked QCTB for an explanation. Reruns of our SRS samples in Kansas City produced values as high as 15.38 on Hard Red Spring and variations from 14.38 to 14.60 on Hard Red Winter in a five week period. The result was a meeting on January 14/15 in Washington D.C. dealing with the discrepancies in Board Appeals and our concerns about inconsistent answers from QCTB. (Notes attached.) That meeting was held at our insistence.

The meeting included myself; Lloyd Brown; Gary Wasson, F.G.I.S. Manager in Portland; Dr. Cliff Watson, Chief, QCTB; Larry Arnhold, supervisor of QCTB's protein program; Irvin Williams, Board of Appeals and Reviews; John Marshall, Director of the Field Management Division; Homer Dunn, Mr. Marshall's assistant; John Giler, Procedures Development Branch; Dr. William Shuey from International Monitoring and David Galliart, the Deputy Administrator.

Several issues were discussed. Our primary concern was why the SRS samples were not keeping Olympia aligned with Kansas City and preventing inter-market differences (Minot to Pacific Northwest). We also raised questions about the validity of the calibration constants that had not been updated since 1982. We presented indications that we had that the Hard Red Spring calibrations were not sound. We were told at that meeting that an evaluation of the calibration constants would be possible, through other data that had been collected, by February 1986.

We discussed SRS samples at length, emphasizing the point that samples, once collected, must have a stable value if the system was to be stable. The old system of changing values by a 0.1% or more by a telephone call from a lab technician at QCTB was not acceptable. We argued the need for stable, accurate values, set by the standard Kjeldahl, that remained fixed throughout the life of a set of reference samples. Changes, if necessary, should come only after considerable study and from senior management.

We also discussed our concerns about the economic impact of making changes in protein values. At that time QCTB was considering a bias increase of +.25 for Hard Red Winter Wheat. We expressed concerns about serious disruption of our foreign and domestic markets by these kinds of changes.

As a result of the meeting, we did implement a number of additional control measures including regular referee samples and increased monitoring.

We did not resolve the questions that we had about the value of the baseline and the reasons for the repeated changes. QCTB continued to insist that there had been no change in their baselines and that there were only minimal fluctuations in their results.

At the meeting, we did find out that in October they had changed their SRS samples, their standard instrument and later learned (by phone from Homer Dunn 1/29/86) that QCTB had a titration problem in the standard Kjeldahl that had caused inaccurate results for an undetermined length of time.

Our followup to that meeting is documented in memos to Homer Dunn (1/24/86), Cliff Watson (1/24/86) and (1/28/86) and Dunn's reply (3/27/86) and memo (3/11/86).

The inconsistent results from QCTB are illustrated by these Hard Red Spring SRS results in November and December 1985.

11/05/85	14.97
11/21/85	15.21
11/25/85	15.32
12/03/85	15.12
12/04/85	15.25
12/06/85	15.31
12/06/85	15.12

Reluctantly, we biased the instrument to the 15.12 value on 12/3/85.

We saw similar fluctuations in the Durum baseline in QCTB runs on the Durum wheat reference samples.

03/22/84	13.83
04/12/85	14.03
04/25/86	14.18

(Memo Brookreson to Dunn 5/13/86.)

In May 1986, at the A.A.G.I.W.A. annual meeting in Vancouver, B.C., the issue of protein values and general dissatisfaction with the functioning of QCTB was discussed with the Administrator, Dr. Kenneth Gilles and the A.A.G.I.W.A. Protein Committee was formed to address problems in the protein program. We learned there that the kind of concerns we had in Washington State were widespread among the other official agencies.

As a result of those discussions, a protein meeting was held in Kansas City, at QCTB, on May 20, 1986. This meeting included a broad representation of official agencies and F.G.I.S. personnel. Many of the issues discussed were procedural. Some of the improvements in procedure suggested became part of the protein instruction, Book V. All present agreed in the need for (1) high quality reference samples with stable values, distributed over a marketing area; (2) quicker response to problems; (3) better communications and (4) cleaner and more consistent procedures. (See Brookreson to Marshall, May 23, 1986.)

In July 1986, at my instruction after considerable discussion and debate with QCTB, we biased the baseline up for Hard Red Spring Wheat and Hard Red Winter Wheat. That adjustment was made only after Gail Jackson, Director, Standardization Division, intervened in the problems between Olympia and QCTB. The sequence was as follows. In early July, we had received new values that would have required between a 0.3% and 0.4% adjustment upward in our baseline values for both winter and spring wheat. Such adjustments would have been, in our view, extremely disruptive for wheat marketing in our area. We contacted F.G.I.S. Headquarters (John Marshall) to again voice our strong objections. It was at this point Gail Jackson became involved. As a result of the discussions with Mr. Jackson, we deleted one reference sample (that he felt did not repeat or predict well enough) in each set and rebiased the instruments based on nine samples. The result was a raise of +.18 for Hard Red Winter and another +0.09 for Hard Red Spring (which we had already raised 0.1% in June). For our own information, we then compared the instrument results with the values we had in March of 1984 by re-running that set of reference samples. The result was a +.14 bias for Hard Red Winter Wheat (12.50 to 12.64) and a +.37 bias for Hard Red Spring Wheat (13.87 to 14.24). We had no way to determine which value was correct but it was clear that we were biased higher, considerably higher in Hard Red Spring, than we had been previously.

We continued to work on procedures with John Giler to try to isolate procedural problems that were causing difficulty. Our greatest concerns, however, became the growing number of foreign quality complaints on protein deficiency on cargoes of Hard Red Spring Wheat from the Pacific Northwest and the remaining serious difference in intermarket protein values. We noted and reported a 0.3% difference between Olympia and the Gulf (Amarillo) and continuing significant differences between us and North Dakota. Foreign quality complaints about protein deficiency were brought to our attention for cargoes to Japan, Taiwan, Korea, Singapore, Malaysia, Thailand and Venezuela by Pacific Northwest exporters, U.S. Wheat Associates and foreign buyers and trade teams.

On September 8, 1986 we replaced the reference sample that we had agreed to delete in our discussions with Gail Jackson with a new SRS sample which reset the average for the SRS set at 15.23 but did not change the instrument bias. We operated at this 15.23 level until April 15, 1987.

On November 19, 1986, the A.A.G.I.W.A. protein committee met again with F.G.I.S. in Kansas City to discuss the continuing protein problems. (Attached are A.A.G.I.W.A. minutes and letter - Brookreson to Marshall - on the meeting.) Many of the problems discussed were again procedural. In November we were still experiencing up to 0.5% difference on units from the Minot area. Several other agencies identified similar problems. To clarify this we set up a sample exchange system on unit trains from the Dakotas to Washington and exchanged reference samples. We expressed our deep concern with the on-going foreign quality complaints and the threat they posed to our export marketing program. On the issue of foreign quality complaints, we received little acknowledgement from QCTB that they existed. (See Watson to Brookreson, 12/16/86, letter Grain Importers Association to Galliart).

III. 1987 Actions Taken to Address the Problems.

In 1987, in our view, we have seen the important steps taken to address the problems that have marked the NIR protein program.

A. Procedural. In February 1987, Book V, the Protein Procedure was sent out for comment. On March 11, John Giler, John Halversen (Standardization), Cliff Watson and Anita Heckenbach (QCTB now QCB), Dr. William Shuey and I met in Kansas City and reviewed the procedural handbook. That handbook was issued on May 1, 1987 and represents the first comprehensive instruction for NIR protein determination. The Handbook was exceptionally well prepared by John Giler and we have found that closely following the procedures significantly improves the consistency and accuracy of protein results.

Several other procedural matters have been addressed that have also had a salutory effect. By June 3, 1987, the UDY Grinders, used in preparing the samples, were equipped with auto feed devices that control the rate grain is feed into the grinder and provide more uniform grinding and particle size which in turn produces more consistent results. The Standardization Division has also conducted a number of studies of grinding time, grinder "warmup" and sample cooling time that have identified and allowed us to address sources of difference. The cumulative result has been to produce far more consistent technique, and consequently results, among protein technicians nationwide.

B. 12% Moisture basis. Effective May 1, 1987, official protein determinations are made on a 12% moisture basis rather than an "as is" moisture basis. This change was proposed in early 1985 and was supported almost uniformly by all the industry groups. The 12% moisture basis is a way of describing or quantifying the protein content of wheat based on the assumption of a fixed amount of moisture. Unfortunately, the relationship between "as is" and 12% moisture basis protein is not linear and at low moisture levels, characteristically found in Washington, Idaho and Montana, the impact on certificated protein is to reduce the figure by 0.2% to 0.6% or more. Originally, this was not fully appreciated by producers in these areas and, although the system has the advantage of much more accurately describing protein for foreign buyers, it has been the source of considerable discontent and monetary loss for those producers. A much better educational program would have been very helpful in this area. The overall impact has been to provide a system of protein determination more acceptable to foreign buyers.

C. National Reference Samples. In April 1987, QCB distributed the first set of national SRS samples. For the first time, these samples have provided a common reference point to compare all instruments involved in official protein determinations. Unlike previous sample sets that consisted of ten Hard Red Spring and ten Hard Red Winter Wheat samples, this ten-sample set consists of both winter and spring samples run on the two calibrations so that the single set checks both calibrations. (Watson to all field offices.)

We were not entirely satisfied with the quality of this initial set. One sample was weevily and another contaminated with durum wheat and barley. None the less, having a single set with an established value is a significant improvement over the past. QCB is currently collecting samples to replace the current set. To maintain the stability of the system, reference samples are being replaced two at a time. Procedures have been put in place to detect and minimize any bias change that may result from new samples.

When these samples were received, they were compared to the then current SRS samples by biasing the instruments, using the existing SRS samples, to the established baseline value. In our case that meant to 15.23. The samples were run on each of our NIR instruments located in eight field laboratories and Olympia. The baseline for the new samples was set by QCB at 13.89 for Hard Red Spring Wheat. The average of 11 runs on our instruments was 13.98. To bias to the baseline would have required a downward bias adjustment of 0.09%. That data was sent to QCB and discussed orally with Cliff Watson on 4/30/87 in Olympia by Washington Protein Coordinator, Arthur Choate. The new samples were scheduled to be put into place on May 4, 1987. (Memo Watson to Field Offices.)

D. April 15 bias adjustment. On April 14, 1987 at 10:55 a.m. EST we were notified by telemail that effective at 12:01 a.m. on April 15, 1987 the baseline value of Hard Red Spring Wheat reference samples would be lowered by 0.2% and all NIR instruments rebiased accordingly. We notified all offices immediately by telephone and followed with written confirmation. That reduced our bias to 15.03. (Memo Marshall to Field Offices, 4/14/87.)

We had been following Dr. Shuey's study of the foreign quality complaints as closely as we could. We had cooperated with the studies by providing cargo samples and information as requested. All the information we had indicated that the Administrator, Kirk Miller's, decision was not only fully justified but absolutely necessary if we were to avoid the loss of critical export markets. WE FULLY SUPPORTED AND CONTINUE TO SUPPORT THIS DECISION. We are not aware of any evidence that anyone profited unduly by the manner in which the decision was made.

Subsequently on May 9, 1987 we received a telemail communication from C.A. Watson lowering the values of the new bulk samples on Hard Red Spring from 13.89 to 13.69. (Memo C.A. Watson to various FOM's.) With the new 12% moisture basis, 13.69 became the operative Hard Red Spring Wheat protein baseline.

E. Instruction of June 15, 1987. On June 15, 1987, E. Lloyd Brown, F.G.I.S. Federal Manger in Olympia, was notified by Ron Bicsak from QCB to bias our instruments up 0.1% above the baseline for Hard Red Spring to correct an overbiasing when the reference value of the new bulk samples was dropped from 13.89 to 13.69. We asked for written confirmation of a change in the baseline but were told that he would get back to us the next day. We later learned that none would be forthcoming. When I was informed of this, I conveyed my objections to Mr. Brown in the strongest terms. My objections were not to the bias but to the method it was being done. As the manager of the program, I did not feel that I could give oral instructions to my employees that directly violated the new instruction that had been issued only two months before. The instruction states with absolute clarity on page 3-5, "All bias adjustments must be made to the reference sample baseline values," and repeats that on page 3-8 and illustrates it by example. We felt, and still feel, that we are as accountable to our employees as they are to us. The new procedure was drafted to standardize procedure and eliminate variations. We felt that this opened the door to undermining the national nature of the program. We also felt that not being public with the correction was a wrong decision that ultimately would hurt the credibility of the program. We shared these concerns in a conference call on June 19 with the Administrator, James Bair (Confidential Assistant to the Administrator), David Galliart (Deputy Administrator), John Marshall (Field Management Division), Homer Dunn (Field Management Division), Gail

Jackson (Standardization), Dr. Shuey and Lloyd Brown. As chair of the A.A.G.I.W.A. protein committee, I was contacted by other agencies expressing the same concerns.

On Wednesday, June 24 I met with the Administrator, Mr. Miller, Lloyd Brown, Ron Biscak, Gail Jackson, Arthur Choate and Gary Wasson, Walter Rust, Robert Baker and Robert O'Toole of F.G.I.S. Portland, at the Portland Field Office, to discuss this issue. At that meeting we specifically asked for firm instructions to change the bias and were told they would not be forthcoming. We did agree to further studies to resolve some apparent differences between locations. In the absence of firm instructions, our instrument remained biased at 13.69. (Biscak/Jackson to Miller summary.)

We continued to closely review monitor samples and appeal data. It became quickly clear that the QCB values had been raised and Board Appeals were averaging +0.1% from our values. This created a serious intermarket difference that we could not tolerate because it worked to the detriment of producers and exporters shipping in and through our Washington ports. Therefore, on July 27, 1987, we issued written instructions to our offices raising the Hard Red Spring Wheat baseline value to 13.79. (Brookreson/Brown to Inspection Area Managers/Protein Specialists) to confirm oral instructions we had given that day. We received two telephone inquiries from the export trade and we explained that the value had been raised to more closely align us with QCB. We received no further question or comment. Our concern was, and remains, how we deal with our employees, agency and the trade.

The accusations I have read indicate that there is a belief that there is another 0.1% bias that instruments need to be raised for Spring Wheat and that somehow values are being deliberately suppressed. Looking at data from the State of Washington, I do not believe this to be true.

As noted, the new bulk SRS samples were run for Spring Wheat on April 14, 1986 with all state of Washington instruments biased to 15.23 on the old reference samples. The average of 11 runs on the new samples was 13.98 or 0.09% above the baseline of 13.89. To reach the baseline, the instrument would need to be biased that amount down. On April 15, the baseline was lowered to 15.03. This would lower the average on the new samples to 13.78 since bias adjustments are linear. Rebiasing the instrument to 13.69 would indicate that we were 0.09 below where the instrument was at the 15.03 level based on this information. The raise of 0.1% on July 27 to 13.79 means that we are 0.01% above the 15.03 baseline results.

I looked at similar figures for the state of Montana that appear to show a similar conclusion. In Montana, the samples were run on April 29, 30 and May 1, after the baseline was lowered to 15.03, but prior to lowering the new bulk samples. Results were as follows.

15.03 Baseline Samples			13.89 Baseline Samples Adjusted		
April 29	bias 15.01	(-.02)	13.79	(-.10)	13.81
April 30	bias 15.01	(-.02)	13.80	(-.09)	13.82
May 1	bias 14.97	(-.04)	13.77	(-.12)	13.81
				Average	13.81

By adding the deviation from the 15.03 baseline to adjust the figures absolutely to the baseline value, the average in the new bulk samples would be 13.81% or -0.08 from the baseline value.

When the baseline was lowered to 13.69, this would have put Montana Grain Inspection at a +.12. The raise to a 13.79 baseline, based on these results, should put Montana -.02 below the results at the old 15.03 figure.

In both cases, instruments are always within the tolerance of ±.15% and are now certainly very close to the position of April 15, according to these figures. If the assumption is that the 15.03 was a justifiable figure, there appears to be no quantifiable basis for objection to 13.79 as a baseline value.

We can object to the process but it appears that the result was appropriate. Since these adjustments were completed we have seen a virtual end to the foreign protein complaints.

F.G.I.S. has a calibration study that should be released at any time that will update the Hard Red Spring Wheat calibrations. That certainly would be the appropriate time to make any further bias adjustments, if any are found to be necessary. Our agency would be opposed to any bias adjustments of the baseline prior to that time. In our view, we are in as good a position as we can be until that study is completed and any necessary adjustments are made in the calibration constants.

IV. Current Status.

In spite of the problems delineated above, it is our view that the NIR protein program is an effective program today. Very significant strides have been taken towards addressing and resolving the problems that have been identified in the program for a number of years. Many of the problems are long standing. It is unrealistic to expect them all to be resolved overnight. But, from all the information I have received both as a program manager and as chairman of the A.A.G.I.W.A. protein committee, we have a better and more consistent national program now than at any time since the NIR program began.

We have good, clear, consistent instructions and procedures, which significantly reduce differences between operators; we have a national set of reference samples that for the first time allow us to compare and really standardize instruments between locations. These samples need to be better. We are in the process of helping to upgrade these samples. Other agencies are also involved. To process and distribute SRS samples is expensive and time consuming. To provide a good, stable SRS sample you not only need several hundred pounds of the highest quality, cleanest grain available but also samples throughout the range of protein tested.

Over the past eighteen months we have identified a number of sources of inaccuracy and variation in how a sample is ground and prepared for NIR protein determination.

We have made considerable progress in addressing these. We have research from Don Koeltzow and the Research and Development Branch about the impact of particle size and temperature that have been very helpful in reducing inconsistency in the system. There are still areas left that need to be researched if we are to have the best possible program. This will require an expenditure of money. We need more field testing and improved communication. We've come a long way but we have a distance to go.

We need to do a better job of explaining the program to the trade. The confusion on the 12% moisture basis should not have happened. That responsibility to do a better job is shared by F.G.I.S. and agencies such as the Washington State Department of Agriculture.

I believe that we have the kind of leadership at F.G.I.S. to successfully resolve the problems. Kirk Miller has our full support in the decision to drop Hard Red Spring reference values by -0.2% on April 15. We felt that a very tough and courageous decision to make. Without that there would have been severe consequences for exports of protein wheat by every indication we have. The decision on how to handle the situation of June 15 was obviously not as we would have liked. We do not know all the considerations involved but again, it cannot have been an easy decision.

In all my contacts with him, Mr. Miller has demonstrated a strong commitment to accomplishing the job that needs to be done in official inspection. He expects the program to work and we see things getting done that were not done before. That's a very refreshing and welcome change. The problems in the protein program were not of his creation but he has taken decisive steps to resolve them. He has our support.

We have made no secret that, in the past, we have been very dissatisfied with leadership at QCB. A change has been made there also. In the last few months we have seen a new chemist, Ron Biscak, who has experience in the trade and a number of other new staff. A new branch chief is currently being sought.

Information is still too slow getting back to the field from QCB. A new computer system should help resolve that problem. We need to be sure that program is adequately funded.

In preparing to come here, I contacted other agencies on the A.A.G.I.W.A. protein committee and I think I speak for us all in saying that we believe that the program is going the right direction. We have been, and will continue to be, critical where criticism is deserved. But, I can say with a feeling of assurance that we are well on the way to the kind of program we all want - a truly consistent, national program. That is the same feeling we conveyed to Gail Jackson in our letter of July 24, 1987. That is the feeling we want to convey to you.

Respectfully,

William E. Brookreson
Grain Inspection Program Manager
Washington State Department of Agriculture

United States
Department of
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Federal Grain
Inspection
Service

Washington,
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20250

W. Brookreson

TO: D. R. Galliart
Deputy Administrator

January 30, 1986

FROM: Homer E. Dunn, Deputy Director
Field Management Division

SUBJECT: January 14 and 15, 1986, Meeting to Discuss Protein Board Appeal Results from Olympia, Washington, on Hard Red Spring Wheat/Minot, South Dakota, Wheat Shipments

This meeting was called to (1) determine cause(s) contributing to wide differences in protein results on Hard Red Spring wheat samples from the State of Washington — Olympia results averaged -0.312 percent on 374 appeal samples; (2) review protein procedures for needed improvement; (3) establish new procedures or methods for improving the protein program. Personnel attending the meeting were William Shuey, John Marshall, Homer Dunn, Eurvin Williams, Clifford Watson, Gary Wasson, Lloyd Brown, Larry Arnold, John Giler, and Bill Brookreson (State of Washington). There was general consensus among the group that the meeting was beneficial and that similar meetings in the future are needed. Listed below are some of the issues discussed in the order covered in the meeting and the decisions or status of each.

1. Constant Moisture Basis. General agreement was reached that a 13.5 percent moisture basis should be used for protein certification. A meeting will be held after William Shuey returns from foreign travel to discuss our approach to accomplish this. Additionally it was suggested a 10.0 percent moisture basis should be used when establishing standard reference sample (SRS) protein values. The Procedures Development Branch (PDB) will resolve this issue by interaction with the Board of Appeals and Review (BAR), Quality Control and Testing Branch (QCTB), and others as necessary. There was considerable concern that this may not be practical and also disagreement about how adjustments would be made when adjusting to the 10.0 percent level.

2. Collection and Evaluation of InfraNet Data. Larry Arnold will discuss InfraNet data with Technicon personnel to see if information is available which may indicate whether or not FGIS calibration equations are correct or if there are other problems of which we should be aware (see attachment 1). This information is due in the director's office by COB February 14, 1986.

3. Evaluation of Current Calibration Equations. Larry Freese, AMS Marketing Research and Development Division Statistics Branch, was given the FGIS sample survey results. The evaluation report of these results is expected from Larry no later than February 2, 1986.

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4. Annual Calibration Equations. QCTB was instructed to begin immediately a separate sample collection for this program, and there will be an annual evaluation for both the Technicon and Dickey-john instruments. Annual evaluation reports will be due from QCTB no later than April 1 of each year. This program will continue in this manner unless QCTB is instructed to do otherwise.

5. Standard Reference Sample (SRS) Values Differ from One Operator to Another. Gary Wasson illustrated on the overhead projector that different operators vary in their results of SRSs as much as 0.3 percent. This was said to be common. The amount of variation and extent of this potential problem must be identified. Most operators apparently either trend high or low from the SRS value. In addition to determining the extent of operator variation, procedures must be developed to tell operators when a bias should be made. There was discussion, but not general agreement, that operators should have an average bias factor that could be used so an SRS would not need to be run each time a new operator comes on the shift. PDB will evaluate and establish appropriate procedures. QCTB will be responsible for determining the extent and amount of operator variation. A proposed plan is due by COB April 15, 1986, from QCTB and PDB.

6. During Ship Loading Operators are Changed Often. It was reported that operators are changed as often as three times during an 8-hour shift. If this is the case and operator results vary as much as reported, this creates difficulty for the loading elevator unless operators are biasing to the base line. PDB will assist the director's office in establishing a policy on this after conditions in item 5 are evaluated.

7. Olympia Hard Red Winter Board Appeal Results Show a Similar Problem as Hard Red Spring Results (see attachment 2). QCTB was directed to investigate immediately this before it becomes a problem. A report of findings is due to the director's office by COB January 31, 1986.

8. Claims That Moisture Above 10.7 Percent has an Effect on Protein Values. Several individuals at the meeting believe, and Gary Wasson illustrated, that moisture above 10.7 percent has an effect on protein results when compared to Kjeldahl. QCTB is to begin immediately a study to determine if this is true. If so, the problem must be clearly outlined and recommendations for correction made. It is suspected a calibration equation problem may exist. No due date was established, but a progress report is due to the director's office by COB February 14, 1986.

9. Wheat Varieties have an Effect on Protein Results. QCTB was directed to collect information to either prove or disprove this claim. This would be accomplished by requesting variety identification from the BAR.

10. There are Predictable Seasonal Variations in Kjeldahl Results. Lloyd Brown stated there are predictable seasonal variations in Kjeldahl results from QCTB. QCTB will send 1 year's records so the director's office can determine if this can be verified. This is due in the director's office by COB January 31, 1986.

11. Some Field Office Requests for New SRS Values are not Timely. Olympia was out of SRS bulk grain and rushed QCTB for the value on the new SRS grain. QCTB says this may have added to them giving an erroneous result of 14.97. They did not have sufficient time to complete their series of tests. PDB will address this problem in the new protein instruction. A 2-month lead time will be required. In the future, QCTB will be sure of the SRS value prior to releasing it. After thorough testing and release of the value, there should be no need for QCTB to issue new or revised SRS values.

12. QCTB is the Reference Lab for Protein Just as the BAR is for Grading. There can be only one standard and that will be QCTB. Therefore, QCTB must be sure of results and develop the confidence of field offices, inspection agencies, and the grain industry where this does not prevail. Results must be accurate!

13. Wasted Time in Verifying if QCTB Kjeldahl is Accurate. QCTB must always have enough checks in the system to know their Kjeldahl results are accurate. Wasting 2-3 weeks proving this fact is totally unacceptable. QCTB was directed to strengthen this area. Much heavier supervision is needed by Cliff Watson and Larry Arnold. A report is forthcoming, but the automatic titrator malfunction that was discovered and corrected about October 15, 1985, is a suspect in this problem.

14. Collection of SRS Grain. It was decided SRS grain does not necessarily need to consist of grain moving through the market. SRSs are used to determine if instruments are accurately reflecting values; i.e., is there a drift in the instrument. Therefore, samples providing the most stable values will be used.

15. A GIMS-type System and "X" Bar "R" Charts should be used. PDB and QCTB will work together to develop a system to monitor and to maintain monitoring records for field and headquarters use similar to the Grain Inspection Monitoring System (GIMS). "X" bar "R" charts will be used in conjunction with this system.

16. Color Coded Mailing Tags. Color coded tags are needed to ensure timely action when priority samples arrive at QCTB. Also, DHL mail service will be used. Procedures for this will be outlined in the new protein instruction.

17. QCTB Adjustment. Approximately October 15, 1985, QCTB began using their new Technicon 400 instrument and approximately that same time began using new SRSs. Also the malfunction in the Kjeldahl titrator was discovered and corrected then. It is believed adjustments to the instrument and possibly Kjeldahl problems at that time resulted in QCTB running higher than their previous results. Therefore, an adjustment downward of 0.1 percent was made on February 17, 1986. A report from QCTB on this is due by COB January 24, 1986. It will be sent to your office upon receipt.

At this time, I believe causes for the difference in appeal results occurred because of problems in the QCTB program. QCTB immediately must intensify supervision of their Kjeldahl lab and issuance of SRS results and begin developing a data base to assist the Agency identify potential problem areas. Claims are being made that moisture, wheat varieties, molds, etc., are causing variations in results (see attachment 4). These must be proven or disproven. QCTB must inform the director's office of any change made in QCTB biases other than biases to the base line value, and great care will be taken prior to changing SRS values in the field. If SRS values are thoroughly checked, there should be very little need for further adjustments. In the past, adjustments to this value have been fairly common. In addition to the above, field offices must give QCTB ample time to arrive at the true value of SRS.

FM will continue to monitor and upgrade this program to ensure uniform procedures are being used in the field. This evaluation will be made by QCTB. A good example is to ensure a uniform procedure is being used for filling cups and striking cups level. This office will continue to keep you updated as we work through this review.

Attachments

cc: L. Arnold
L. Brown
J. Marshall
C. Watson
E. Williams
W. Brookreson
J. Giler
W. Shuey
G. Wasson

Attachment 1

Richards-Gebaur AFB
Building 221
Grandview, MO 64030

January 13, 1986

TO: John W. Marshall, Director
Field Management Division

THRU: C. A. Watson, Branch Chief
Quality Control and Testing Branch C.A. Watson

FROM: Larry Arnold, Chemist
Quality Control and Testing Branch

SUBJECT: InfraNet Status Report

The trial study of InfraNet in conjunction with Technicon Instruments Corporation (TIC) is well underway. All five FGIS locations (four export sites and QCTB) are collecting and transmitting data to TIC in Tarrytown, NY. To date, reflectance data for 2689 wheat samples have been transmitted. Of these, 269 samples have been selected by "PICKS" software for laboratory analysis (Kjeldahl protein and air oven moisture), and 196 of these have been received by QCTB (summarized in Table 1). QCTB is in the process of performing laboratory analyses on these samples, and will be transmitting the data to TIC during the next couple of weeks. TIC reports that once the data are received, they will begin preliminary calibration work.

QCTB is in the process of obtaining a second HP-85 micro-computer so that PICKS - selected samples may be analyzed on a dedicated I/A 400 NIR instrument at QCTB. This will allow the normal daily workload (i.e., monitoring, collaboratives, and board appeal samples) to flow more smoothly on the master I/A 400 instrument.

Dennis Durango, Marketing Manager, Agriculture, Technicon Industrial Systems Division, reports (1/10/86) that TIC engineered InfraNet for use with AT&T telecommunications. These specifications do not conform with USDA requirements to use the DEPNET (contracted to GTE Telenet). In discussions with GTE representatives, TIC was informed that the use of GTE Telenet for InfraNet would require installation of an "out-dialer" at each FGIS location included in the InfraNet program. At a cost of $300/month per location plus service fees, this would represent a cost for FGIS of greater than $4200/month for the fourteen locations included in phase IV of the program. Phil Donehower, FGIS/PAB, suggested (1/10/86) that the use of GTE Telenet is not strictly mandatory if costs are prohibitive, and that TIC should address a memo to Mel Aston stating the cost requirements of using GTE Telenet for InfraNet so that we may request a waiver (to be approved by Sid Haggard, USDA/OIRM).

Dennis Durango also reports (1/10/86) that in two weeks TIC will begin testing the final "hard-wire" product for InfraNet (to be installed in the I/A 400 NIR instruments) and that perhaps by mid-February we can begin phasing into the permanent hardware version of InfraNet and discontinue the use of HP-85 micro-computers. This will represent Phase III of the four-phase InfraNet study plan as initially conceived.

Table 1. Summary of InfraNet wheat samples processed through January 10, 1986. Abbreviations and InfraNet location codes are for QCTB (QCT), Portland Field Office (PFO), Terminal Four Elevator, Portland, OR (PT4), Duluth Field Office (DFO), and Pasadena Field Office (PAS).

	HRW	HRS	DU	WW	SRW	TOTAL
QCT (01)	282	298	76	21	25	702
PFO (02)	150	106	42	13		311
PT4 (03)	646	347		68		1061
DFO (04)	33	519	1			553
PAS (05)	62					62
Total No. Records Transmitted	1173	1270	119	102	25	2689
No. Selected/Recd. by QCTB	67	84	19	22	4	196

cc: Shuey

United States
Department of
Agriculture

Federal Grain
Inspection
Service

Field Management Division
Board of Appeals and Review
Richards-Gebaur AFB, Bldg. 221
Grandview, MO 64030

Attachment 2

December 10, 1985

TO: Homer Dunn, Deputy Director
Field Management Division

FROM: A. R. Class, Chairman
Board of Appeals and Review ARC

SUBJECT: Olympia/Portland Board Appeals

Per/your request, we have listed all Board appeals that were received from Olympia and Portland in chronological order. During the period September 17 through December 9 there were 374 Hard Red Spring (HRS) and 56 Hard Red Winter (HRW) wheat appeals processed from the two locations. There were 343 HRS from Olympia and 31 from Portland. Olympia accounted for 55 of the HRW appeals.

The Olympia HRS appeal results compared minus 0.312 percent and Portland compared minus 0.174 percent, with an overall comparison to Quality Control (QC) of minus 0.267 percent. Of the 374 samples, the field results were: 26 same, 23 plus, and 325 minus.

It is our policy to have all Board appeals submitted to Kjeldahl for support documentation in case a problem arises. Kjeldahl results are recorded on the appeal log with a copy of the log retained by QC for review if necessary (copy attached). We have received Kjeldahl results for 199 of the 374 HRS appeals. We expect to receive the other results within the next two to three weeks. The 199 samples indicate that QC results were minus 0.194 percent. It should be noted that the QC results during the period September 17 through October 24 were considerably lower than Kjeldahl (0.224 percent), while results received after this period were in much closer agreement (0.062 percent).

Although we have not received any HRW appeals from Olympia or Portland since October 11, there are indications that the same problem may exist if a large volume of HRW begins to move within the Olympia market.

If you have any questions or the information is unclear, please advise.

Enclosures

rec'd. 12/12/8
jal

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SUPPLEMENTAL MONITORING

F/O Olympia/Portland INSP. AGENCY ____________ DATE ______

LI/ACC P = Portland GRAIN FACTOR HARD RED SPRING

	DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
P	9/17/85	Barge 52	14.6	0.3	0.0	14.4	0.1	0.0	14.3	14.0
P	9/17/85	Barge 551	15.1	0.8	0.0	14.5	0.2	0.0	14.3	14.3
	9/26/85	CS 868	12.9	0.0	0.3	12.8	0.0	0.4	13.2	13.5
	9/26/85	NAHX 479166	13.0	0.0	0.3	12.8	0.0	0.5	13.3	13.6
	9/26/85	GN 171549	13.1	0.0	0.0	12.8	0.0	0.3	13.1	13.5
	9/26/85	RRRX 1058	13.1	0.1	0.0	12.9	0.0	0.2	13.0	13.4
	9/26/85	TRNX 500294	12.8	0.0	0.0	12.8	0.0	0.0	12.8	13.2
	9/26/85	NAHX 481846	13.2	0.0	0.0	12.9	0.0	0.3	13.2	13.6
	9/26/85	CAGX 285	13.2	0.0	0.1	13.1	0.0	0.2	13.3	13.7
	9/26/85	BN 460356	13.1	0.0	0.1	13.0	0.0	0.2	13.2	13.4
	9/26/85	BN 454824	12.5	0.0	0.3	12.4	0.0	0.4	12.8	13.0
	9/26/85	TRGX 1018	12.9	0.1	0.0	12.6	0.0	0.2	12.8	13.1
	9/26/85	BN 458468	13.7	0.1	0.0	13.2	0.0	0.4	13.6	13.8
	9/26/85	BN 454608	12.9	0.2	0.0	12.4	0.0	0.3	12.7	13.0
	9/26/85	GTAX 20182	12.9	0.0	0.1	12.7	0.0	0.3	13.0	13.2
	9/26/85	BN 461367	13.2	0.1	0.0	12.8	0.0	0.3	13.1	13.4
	9/26/85	PVGX 1016	13.2	0.2	0.0	12.8	0.0	0.2	13.0	13.3
	9/26/85	Barge C600	14.2	0.2	0.0	13.8	0.0	0.2	14.0	14.2
	9/30/85	Barge C551	13.9	0.1	0.0	13.8	0.0	0.0	13.8	14.0
	9/30/85	Barge T77	14.6	0.2	0.0	14.8	0.4	0.0	14.4	14.5
	10/03/85	Barge T44	14.0	0.4	0.0	13.8	0.2	0.0	13.6	13.7
	10/3/85	Barge T75	13.3	0.1	0.0	13.5	0.3	0.0	13.2	13.3
	10/3/85	BN 461797	13.4	0.2	0.0	12.8	0.0	0.4	13.2	13.4
	10/3/85	BN 458744	12.7	0.0	0.0	12.5	0.0	0.2	12.7	13.0
	10/3/85	BN 457770	12.8	0.0	0.1	12.8	0.0	0.1	12.9	13.3
	10/3/85	TILX 510458	13.1	0.2	0.0	12.9	0.0	0.0	12.9	13.3
	10/3/85	BN 461472	12.9	0.0	0.1	12.7	0.0	0.3	13.0	13.4

F/O ______________ INSP. AGENCY ______________ DATE ______________

LI/ACG ______________ GRAIN FACTOR HARD RED SPRING

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
10/24/85	MILW 100911	13.1	0.6	0.0	12.4	0.0	0.1	12.5	12.9
10/24/85	SOO 75385	12.2	0.0	0.0	11.9	0.0	0.3	12.2	12.5
10/24/85	BN 454073	12.3	0.0	0.1	12.2	0.0	0.2	12.4	12.6
10/24/85	FWD 3203	11.9	0.2	0.0	11.6	0.0	0.0	11.6	12.0
10/24/85	NAHX 476229	12.4	0.0	0.1	12.2	0.0	0.3	12.5	12.6
10/24/85	SOO 70761	12.4	0.1	0.0	11.9	0.0	0.4	12.3	12.7
10/24/85	SOO 71277	12.1	0.0	0.2	12.1	0.0	0.2	12.3	12.6
10/24/85	SOO 70587	12.1	0.0	0.2	11.8	0.0	0.5	12.3	12.6
10/24/85	MILW 100384	12.4	0.0	0.1	12.0	0.0	0.5	12.5	12.8
10/24/85	MILW 100588	12.5	0.1	0.0	12.2	0.0	0.2	12.4	12.7
10/24/85	XTRX 76397	12.1	0.0	0.3	11.9	0.0	0.5	12.4	12.6
10/24/85	XTRX 76379	12.2	0.0	0.0	11.9	0.0	0.3	12.2	12.6
10/24/85	SOO 75113	12.1	0.0	0.1	12.0	0.0	0.2	12.2	12.5
10/24/85	SOO 70591	12.1	0.0	0.2	12.3	0.0	0.0	12.3	12.7
10/24/85	SOO 75457	12.3	0.0	0.3	12.1	0.0	0.5	12.6	12.7
10/24/85	SOO 74444	12.3	0.0	0.0	11.9	0.0	0.4	12.3	12.5
10/24/85	SOO 74328	12.2	0.0	0.0	12.1	0.0	0.1	12.2	12.5
10/24/85	SOO 88423	12.7	0.0	0.0	12.3	0.0	0.4	12.7	12.8
10/24/85	NAHX 52883	12.2	0.0	0.3	12.4	0.0	0.1	12.5	12.6
10/24/85	MILW 100849	12.3	0.0	0.2	12.2	0.0	0.3	12.5	12.6
10/24/85	MILW 100650	12.4	0.0	0.3	12.1	0.0	0.6	12.7	12.7
10/24/85	SOO 71987	12.3	0.0	0.3	12.0	0.0	0.6	12.6	12.8
10/24/85	SOO 71187	12.2	0.0	0.2	12.0	0.0	0.4	12.4	12.4
10/24/85	MILW 101244	12.5	0.0	0.3	12.5	0.0	0.3	12.8	12.7
10/28/85	TLCX 30803	12.1	0.0	0.5	12.1	0.0	0.5	12.6	12.6
10/28/85	TLCX 30688	11.9	0.0	0.5	12.2	0.0	0.2	12.4	12.4
10/28/85	TLCX 30686	11.9	0.0	0.2	12.1	0.0	0.0	12.1	12.4

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F/O ______________ INSP. AGENCY ______________ DATE ______________

LI/ACC ______________ GRAIN FACTOR Hard Red Spring

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
10/03/85	GROX 1060	13.1	0.1	0.0	12.9	0.0	0.1	13.0	13.2
10/03/85	BN 447591	13.2	0.0	0.0	12.8	0.0	0.4	13.2	13.4
10/03/85	BN 452247	13.2	0.1	0.0	12.7	0.0	0.4	13.1	13.4
P 10/10/85	Barge 43	13.4	0.2	0.0	13.3	0.1	0.0	13.2	13.2
10/10/85	BN 455543	12.8	0.0	0.1	12.8	0.0	0.1	12.9	13.2
10/10/85	TRGX 1074	12.9	0.0	0.3	12.8	0.0	0.4	13.2	13.6
10/10/85	GN 170125	12.9	0.0	0.2	12.7	0.0	0.4	13.1	13.4
10/10/85	CBO 86513	12.9	0.0	0.1	12.5	0.3	0.0	12.8	13.2
10/10/85	BN 461579	12.7	0.0	0.3	12.7	0.0	0.3	13.0	13.4
10/10/85	BN 451850	12.9	0.0	0.2	12.8	0.0	0.3	13.1	13.4
10/10/85	BN 451643	12.9	0.0	0.3	12.9	0.0	0.3	13.2	13.6
10/10/85	PLCX 22754	12.9	0.0	0.1	12.4	0.0	0.6	13.0	13.3
10/10/85	GCGX 465	12.8	0.0	0.2	12.4	0.0	0.6	13.0	13.3
10/10/85	CAGX 374	12.9	0.0	0.0	12.6	0.0	0.3	12.9	13.2
10/10/85	BN 460928	13.0	0.0	0.2	12.8	0.0	0.4	13.2	13.4
10/10/85	BN 460297	13.2	0.0	0.1	12.6	0.0	0.7	13.3	13.7
10/10/85	BN 456384	12.9	0.0	0.1	12.4	0.0	0.6	13.0	13.3
10/10/85	SSW 74203	12.0	0.2	0.0	12.5	0.0	0.3	12.2	12.2
10/14/85	MILW 101572	12.6	0.0	0.7	12.3	0.0	1.0	13.3	13.6
10/14/85	MILW 101304	12.1	0.0	0.3	12.2	0.0	0.2	12.4	12.6
10/14/85	MILW 101409	12.6	0.0	0.0	12.2	0.0	0.4	12.6	12.8
10/14/85	MILW 101418	12.6	0.1	0.0	12.2	0.0	0.3	12.5	12.6
10/14/85	OR 10718	12.2	0.0	0.4	12.1	0.0	0.5	12.6	12.8
10/14/85	NAHX 56072	12.2	0.0	0.2	12.2	0.0	0.2	12.4	12.6
10/14/85	NAHX 488742	12.1	0.0	0.1	12.1	0.0	0.1	12.2	12.5
10/15/85	SOO 70881	12.8	0.0	0.0	12.4	0.0	0.4	12.8	12.9
10/15/85	NAHX 53574	12.5	0.1	0.0	12.5	0.1	0.0	12.4	12.8

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F/O ______________ INSP. AGENCY ______________ DATE ______________

LI/ACG ______________ GRAIN FACTOR HARD RED SPRING

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
10/15/85	SOO 74941	12.8	0.0	0.1	12.8	0.0	0.1	12.9	13.1
10/15/85	SOO 71651	12.6	0.0	0.0	12.4	0.0	0.2	12.6	12.9
10/15/85	SOO 71319	12.4	0.0	0.2	12.0	0.0	0.6	12.6	12.7
10/15/85	SOO 71959	12.7	0.0	0.0	12.6	0.0	0.1	12.7	12.8
10/15/85	SOO 72857	12.6	0.0	0.3	12.5	0.0	0.4	12.9	13.1
10/15/85	NAHX 488500	12.7	0.0	0.1	12.6	0.0	0.2	12.8	12.9
10/15/85	TCAX 60072	12.4	0.0	0.2	12.2	0.0	0.4	12.6	12.8
10/15/85	MILW 100289	12.6	0.0	0.0	12.6	0.0	0.0	12.6	12.8
10/15/85	SOO 74611	12.5	0.0	0.2	12.4	0.0	0.3	12.7	13.0
10/15/85	SOO 33212	12.6	0.0	0.0	12.7	0.1	0.0	12.6	12.8
10/15/85	SOO 23283	12/8	0.1	0.0	12.4	0.0	0.3	12.7	12.9
10/15/85	SOO 88966	12.7	0.0	0.1	12.5	0.0	0.3	12.8	13.0
10/15/85	DR 10557	12.7	0.0	0.1	12.5	0.0	0.3	12.8	13.0
10/15/85	NAHX 50830	12.8	0.2	0.0	12.4	0.0	0.2	12.6	12.8
10/15/85	NAHX 53842	12.8	0.0	0.1	12.8	0.0	0.1	12.9	13.1
10/15/85	CBQ 184863	14.8	0.0	0.2	15.0	0.0	0.0	15.0	15.1
10/15/85	BN 460402	14.6	0.0	0.0	14.5	0.0	0.1	14.6	14.4
10/15/85	RRRX 1077	15.0	0.0	0.2	15.0	0.0	0.2	15.2	15.5
10/15/85	BN 447084	15.0	0.0	0.2	15.1	0.0	0.1	15.2	15.4
10/15/85	NAHX 478098	12.3	0.0	0.2	12.2	0.0	0.3	12.5	12.7
10/15/85	SOO 75729	12.6	0.0	0.2	12.6	0.0	0.2	12.8	13.0
10/15/85	NAHX 800071	12.5	0.1	0.0	12.5	0.1	0.0	12.4	12.8
10/15/85	CGCX 20016	15.0	0.0	0.5	15.2	0.0	0.3	15.5	15.3
10/15/85	NAHX 488649	12.5	0.0	0.0	12.8	0.3	0.0	12.5	12.7
10/15/85	SOO 71621	12.6	0.0	0.2	12.5	0.0	0.3	12.8	13.0
10/15/85	NAHX 800159	12.6	0.1	0.0	12.6	0.1	0.0	12.5	12.8
10/15/85	MILW 100297	12.3	0.0	0.2	12.3	0.0	0.2	12.5	12.7

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DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
10/15/85	NAHX 800227	12.3	0.1	0.0	12.4	0.2	0.0	12.2	12.6
10/15/85	TRNX 500171	15.0	0.0	0.4	15.5	0.1	0.0	15.4	15.7
10/15/85	BN 451650	14.7	0.0	0.4	15.2	0.1	0.0	15.1	15.2
10/15/85	SOO 84331	12.7	0.2	0.0	12.4	0.0	0.1	12.5	12.9
10/15/85	SOO 76532	12.8	0.2	0.0	12.5	0.0	0.1	12.6	12.9
10/15/85	SOO 74060	12.6	0.0	0.0	12.7	0.1	0.0	12.6	12.8
10/15/85	SLSF 86551	14.6	0.0	0.3	14.8	0.0	0.1	14.9	15.0
10/15/85	SOO 34540	12.6	0.2	0.0	12.4	0.0	0.0	12.4	12.8
10/15/85	LEF 80009	12.5	0.2	0.0	12.5	0.2	0.0	12.3	12.7
10/15/85	SLSF 81170	15.0	0.0	0.2	15.0	0.0	0.2	15.2	15.5
10/15/85	DR 10604	12.8	0.2	0.0	12.6	0.0	0.0	12.6	12.9
10/15/85	SOO 33167	12.8	0.0	0.0	12.4	0.0	0.4	12.8	13.0
10/15/85	SOO 70401	12.8	0.0	0.1	12.8	0.0	0.1	12.9	12.9
10/15/85	SOO 71275	12.6	0.0	0.2	12.8	0.0	0.0	12.8	13.0
10/15/85	MILW 101405	12.6	0.0	0.2	12.3	0.0	0.5	12.8	12.9
10/15/85	NAHX 800178	12.2	0.0	0.3	12.3	0.0	0.2	12.5	12.8
10/15/85	BN 461412	16.0	0.0	0.2	16.2	0.0	0.0	16.2	16.3
10/15/85	SOO 84791	12.5	0.0	0.2	12.4	0.0	0.3	12.7	12.9
10/15/85	SOO 88246	12.8	0.1	0.0	12.8	0.1	0.0	12.7	13.0
10/15/85	CGCX 20382	15.0	0.0	0.3	15.1	0.0	0.2	15.3	15.2
10/15/85	SLSF 79501	15.3	0.0	0.2	15.5	0.0	0.0	15.5	15.8
10/15/85	SOO 75102	12.8	0.1	0.0	12.7	0.0	0.0	12.7	13.0
10/15/85	SOO 33300	12.4	0.0	0.1	12.6	0.1	0.0	12.5	12.9
10/15/85	NAHX 480863	15.0	0.0	0.2	15.0	0.0	0.2	15.2	15.3
10/15/85	SOO 74763	12.7	0.0	0.0	12.4	0.0	0.3	12.7	12.9
10/15/85	SOO 75671	12.7	0.0	0.0	12.4	0.0	0.3	12.7	12.9
10/15/85	SOO 75464	12.6	0.1	0.0	12.4	0.0	0.1	12.5	12.8

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DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJĖLDAHL
10/15/85	SOO 72285	12.9	0.3	0.0	12.7	0.1	0.0	12.6	12.9
10/15/85	SOO 71495	12.6	0.0	0.0	12.6	0.0	0.0	12.6	13.0
10/15/85	SOO 75046	12.7	0.2	0.0	12.4	0.0	0.1	12.5	12.8
10/15/85	SOO 71279	13.4	0.4	0.0	13.0	0.0	0.0	13.0	13.2
10/15/85	NAHX 475452	12.9	0.2	0.0	12.6	0.0	0.1	12.7	12.9
10/15/85	NAHX 475569	12.6	0.0	0.0	12.6	0.0	0.0	12.6	12.8
10/15/85	SOO 75107	13.0	0.1	0.0	12.6	0.0	0.3	12.9	13.0
10/24/85	DR 10061	12.4	0.0	0.1	12.2	0.0	0.3	12.5	12.6
10/24/85	SOO 74890	12.4	0.2	0.0	12.0	0.0	0.2	12.2	12.5
10/24/85	NAHX 488754	12.4	0.0	0.2	12.4	0.0	0.2	12.6	12.6
10/24/85	MILW 101977	12.2	0.0	0.4	12.5	0.0	0.1	12.6	12.7
10/24/85	NAHX 800142	12.4	0.0	0.3	12.4	0.0	0.3	12.7	12.9
10/24/85	MILW 100069	12.7	0.0	0.2	12.4	0.0	0.5	12.9	13.0
10/24/85	SOO 74532	12.2	0.0	0.0	12.0	0.0	0.2	12.2	12.4
10/24/85	SOO 75065	12.0	0.0	0.3	12.0	0.0	0.3	12.3	12.5
10/24/85	NAHX 800418	12.5	0.1	0.0	12.0	0.0	0.4	12.4	12.7
10/24/85	MILW 100587	12.4	0.0	0.3	12.3	0.0	0.4	12.7	12.8
10/24/85	SOO 73563	12.6	0.1	0.0	12.2	0.0	0.3	12.5	12.7
10/24/85	SOO 74425	12.2	0.0	0.1	11.9	0.0	0.4	12.3	12.6
10/24/85	MILW 100621	12.4	0.1	0.0	12.5	0.2	0.0	12.3	12.7
10/24/85	MILW 100802	12.4	0.0	0.0	12.1	0.0	0.3	12.4	12.8
10/24/85	BN 452114	14.5	0.0	0.0	13.9	0.0	0.6	14.5	14.5
10/24/85	USLX 20717	14.8	0.5	0.0	14.1	0.0	0.2	14.3	14.5
10/24/85	SOO 75596	12.6	0.2	0.0	12.4	0.0	0.0	12.4	12.7
10/24/85	XTRX 76260	12.2	0.0	0.1	11.9	0.0	0.4	12.3	12.6
10/24/85	NAHX 53737	12.2	0.0	0.2	12.0	0.0	0.4	12.4	12.6
10/24/85	NAHX 50916	12.6	0.0	0.1	12.5	0.0	0.2	12.7	13.0

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	DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
	10/28/85	TLCX 30853	11.8	0.0	0.4	12.0	0.0	0.2	12.2	12.3
	10/28/85	TLCX 30836	11.9	0.0	0.6	12.0	0.0	0.5	12.5	12.3
	10/28/85	TLCX 30781	11.9	0.0	0.5	12.0	0.0	0.4	12.4	12.4
P	10/31/85	SLSF 79048				12.5	0.0	0.1	12.6	12.5
P	10/31/85	BN 453305				12.5	0.0	0.5	13.0	13.0
P	10/31/85	GTAX 20129				12.5	0.0	0.3	12.8	12.9
P	10/31/85	NP 76467				12.4	0.0	0.2	12.6	12.7
P	10/31/85	PLCX 22965				13.0	0.0	0.1	13.1	13.2
P	10/31/85	BN 447643				12.6	0.0	0.1	12.7	12.7
P	10/31/85	BN 450931				12.3	0.0	0.1	12.4	12.5
P	10/31/85	BN 458609				12.6	0.0	0.1	12.7	12.7
P	10/31/85	BN 446963				12.3	0.0	0.3	12.6	12.6
P	10/31/85	BN 452525				12.6	0.0	0.2	12.8	12.8
P	10/31/85	BN 458620				12.6	0.0	0.0	12.6	12.8
P	10/31/85	USLX 26675				12.2	0.0	0.5	12.7	12.8
P	11/01/85	LML 600	14.3	0.4		13.7		0.2	13.9	14.0
	11/05/85	CAGX 150	15.4	0.6		15.4	0.6		14.8	14.9
	11/05/85	CAGX 395	15.8		0.4	15.9		0.3	16.2	16.2
	11/05/85	PLCX 22961	16.2		0.3	16.2		0.3	16.5	16.6
	11/05/85	MILW 100377	12.6		0.4	12.3		0.7	13.0	12.9
	11/05/85	BN 449417	15.0		0.3	15.2		0.1	15.3	15.6
P	11/07/85	PVGX 1064				12.3		0.3	12.6	12.8
P	11/07/85	CBQ 185135				12.4		0.4	12.8	12.8
P	11/07/85	CRDX 7187				12.7		0.1	12.8	12.9
P	11/07/85	BN 456484				12.7	0.0	0.0	12.7	12.7
P	11/07/85	SCOX 1653				12.4		0.1	12.5	12.7
P	11/07/85	TILX 310362				12.7	0.0	0.0	12.7	12.7

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	DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
P	11/07/85	PVGX 1174				12.4		0.4	12.8	12.8
P	11/07/85	BN 447421				12.3		0.1	12.4	12.5
P	11/07/85	BN 447315				12.3		0.1	12.4	12.4
P	11/07/85	BN 452566				12.3		0.2	12.5	12.6
P	11/07/85	BN 446485				12.2		0.3	12.5	12.7
P	11/07/85	BN 448917				12.4		0.3	12.7	12.8
P	11/07/85	BN 452265				12.3		0.2	12.5	12.6
P	11/07/85	PBLX 20132				12.4		0.2	12.6	12.7
P	11/07/85	FWD 459660				12.4		0.4	12.8	12.9
	11/08/85	ST 40	14.0		0.3	14.2		0.1	14.3	14.4
	11/14/85	SOO 76413	12.4		0.3	12.3		0.4	12.7	
	11/14/85	SOO 74060	12.4		0.4	12.2		0.6	12.8	
	11/14/85	NAHX 475569	12.4		0.2	12.3		0.3	12.6	
	11/14/85	NAHX 478062	12.3		0.4	12.3		0.4	12.7	
	11/14/85	SOO 75671	12.5	0.1		12.0		0.4	12.4	
	11/14/85	SOO 33212	12.2		0.4	12.2		0.4	12.6	
	11/14/85	NAHX 488649	12.5		0.2	12.3		0.4	12.7	
	11/14/85	SOO 71319	12.0		0.5	12.2		0.3	12.5	
	11/14/85	DR 10604	12.3		0.4	12.2		0.5	12.7	
	11/14/85	SOO 74941	12.4		0.4	12.7		0.1	12.8	
	11/14/85	SOO 33300	12.4		0.1	12.2		0.3	12.5	
	11/14/85	MILW 101405	12.4		0.2	12.4		0.2	12.6	
	11/14/85	SOO 84791	12.5		0.2	12.2		0.5	12.7	
	11/14/85	NAHX 478098	12.6		0.1	12.3		0.4	12.7	
	11/14/85	MILW 101197	12.3		0.4	12.2		0.5	12.7	
	11/14/85	LEF 8009	12.3		0.5	12.3		0.5	12.8	
	11/18/85	CCT 171	12.8			12.9	0.1		12.8	

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LI/ACC ______________ GRAIN FACTOR HARD RED SPRING

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11/18/85	NAHX 800178	12.2		0.3	12.2		0.3	12.5	
11/18/85	SOO 71275	12.6			12.4		0.2	12.6	
11/18/85	SOO 71609	12.2		0.5	12.5		0.2	12.7	
11/18/85	MILW 100297	12.3		0.2	12.4		0.1	12.5	
11/18/85	SOO 75181	12.5			12.1		0.4	12.5	
11/18/85	NAHX 481777	12.4		0.4	12.4		0.4	12.8	
11/18/85	SOO 34540	12.4			12.2		0.2	12.4	
11/18/85	MILW 100170	12.3		0.3	12.3		0.3	12.6	
11/18/85	SOO 75102	12.3		0.3	12.3		0.3	12.6	
11/18/85	NAHX 57465	12.1		0.4	12.1		0.4	12.5	
11/18/85	SOO 75107	12.3		0.3	12.2		0.4	12.6	
11/18/85	UTCX 44480	12.3		0.1	12.4			12.4	
11/18/85	NAHX 800159	12.2		0.4	12.1		0.5	12.6	
11/18/85	NAHX 46778	12.3		0.1	12.2		0.2	12.4	
11/18/85	NAHX 800227	12.6			12.4		0.2	12.6	
11/19/85	T 73	14.0		0.3	14.2		0.1	14.3	
11/19/85	T 44	14.4	0.2		14.2			14.2	
11/29/85	SOO 88037	11.9		0.2	11.7		0.4	12.1	
11/29/85	SOO 70257	12.1		0.2	12.0		0.3	12.3	
11/29/85	SOO 74318	11.9		0.4	12.0		0.3	12.3	
11/29/85	SOO 75465	12.6		0.3	12.8		0.1	12.9	
11/29/85	SOO 74792	13.1		0.3	13.1		0.3	13.4	
11/29/85	SOO 74266	11.9		0.8	12.0		0.7	12.7	
11/29/85	SOO 76558	12.5		0.3	12.1		0.7	12.8	
11/29/85	BN 461735	12.3		0.8	12.1		1.0	13.1	
11/29/85	NAHX 800334	12.1		0.4	12.0		0.5	12.5	
11/29/85	MILW 100145	12.1		0.4	12.0		0.5	12.5	

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11/29/85	MILW 101390	12.2		0.6	12.0		0.8	12.8	
11/29/85	MILW 100531	12.1		0.4	12.2		0.3	12.5	
11/29/85	SOO 75469	12.4		0.1	12.0		0.5	12.5	
11/29/85	XTRX 76270	12.2			11.8		0.4	12.2	
11/29/85	CBQ 184455	12.3		0.6	12.2		0.7	12.9	
11/29/85	BN 458240	12.6		0.3	12.3		0.6	12.9	
11/29/85	SOO 71213	12.6		0.2	12.2		0.6	12.8	
11/29/85	SLSF 79313	12.7	0.1		12.4		0.2	12.6	
11/29/85	BN 451941	12.6		0.1	12.2		0.5	12.7	
11/29/85	BN 460530	12.6		0.3	12.7		0.2	12.9	
11/29/85	NAHX 481953	14.2		0.3	13.9		0.6	14.5	
11/29/85	SOO 75247	12.5		0.2	12.2		0.5	12.7	
11/29/85	NAHX 53823	12.4		0.3	12.2		0.5	12.7	
11/29/85	SLSF 79439	12.3		0.5	12.1		0.7	12.8	
11/29/85	PVGX 1034	12.3		0.6	12.2		0.7	12.9	
11/29/85	BN 451845	12.2		0.4	12.2		0.4	12.6	
11/29/85	DR 10636	12.0		0.2	11.9		0.3	12.2	
11/29/85	XTRX 75036	12.0		0.3	12.0		0.3	12.3	
11/29/85	PLCX 22857	12.7		0.3	12.4		0.6	13.0	
11/29/85	CBQ 184683	12.5		0.3	12.4		0.4	12.8	
11/29/85	USLX 26532	12.7		0.2	12.3		0.6	12.9	
11/29/85	SOO 74646	12.0		0.4	12.2		0.2	12.4	
11/29/85	BN 460850	12.4		0.1	12.2		0.5	12.7	
11/29/85	SLSF 86545	12.1			12.2		0.5	12.7	
11/29/85	SOO 75272	11.9		0.5	12.0		0.4	12.4	
11/29/85	SOO 75373	11.9		0.5	11.8		0.6	12.4	
11/29/85	SOO 75321	12.4		0.3	12.4		0.3	12.7	

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LI/ACG ______ GRAIN FACTOR HARD RED SPRING

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11/29/85	SOO 84120	12.2		0.3	11.8		0.7	12.5	
11/29/85	BN 449280	12.7		0.3	12.1		0.9	13.0	
11/29/85	TRNX 500269	12.3		0.2	12.4		0.1	12.5	
11/29/85	SOO 34962	12.0		0.9	12.1		0.8	12.9	
11/29/85	MILW 101218	12.3		0.6	12.0		0.9	12.9	
11/29/85	MILW 101420	12.3		0.4	12.4		0.3	12.7	
11/29/85	PLCX 23029	12.6		0.3	12.4		0.5	12.9	
11/29/85	BN 454416	12.7		0.5	12.9		0.3	13.2	
11/29/85	BN 446781	12.4		0.4	12.3		0.5	12.8	
11/29/85	TRNX 500109	12.4		0.7	12.4		0.7	13.1	
11/29/85	BN 449361	12.5		0.7	12.2		1.0	13.2	
11/29/85	BN 461159	12.6		0.5	12.4		0.7	13.1	
11/29/85	BN 455146	12.5		0.5	12.1		0.9	13.0	
11/29/85	BN 458187	12.4		0.4	12.1		0.7	12.8	
11/29/85	BN 460351	12.7		0.3	12.4		0.6	13.0	
11/29/85	BN 448654	12.5		0.2	12.2		0.5	12.7	
11/29/85	CRDX 7202	12.6		0.5	12.4		0.7	13.1	
11/29/85	FWD 459563	12.5		0.4	12.4		0.5	12.9	
11/29/85	BN 462185	12.7		0.1	12.3		0.5	12.8	
11/29/85	SOO 71931	12.4		0.6	12.3		0.7	13.0	
11/29/85	SOO 74971	12.5		0.2	12.4		0.3	12.7	
11/29/85	GCGX 419	12.5		0.5	12.4		0.6	13.0	
11/29/85	SLSF 79164	12.6		0.5	12.3		0.8	13.1	
11/29/85	SOO 75529	12.1		0.4	12.3		0.2	12.5	
11/29/85	SOO 71223	12.4		0.2	12.2		0.4	12.6	
11/29/85	SOO 71939	12.4		0.3	12.6		0.1	12.7	
11/29/85	WEIX 1010	12.4		0.2	12.4		0.2	12.6	

F/O ______ INSP. AGENCY ______ DATE ______

LI/ACG ______ GRAIN FACTOR HARD RED SPRING

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
11/29/85	GTAX 20055	12.4		0.2	11.8		0.8	12.6	
11/29/85	BN 461975	12.4		0.5	12.0		0.9	12.9	
11/29/85	PVGX 2050	12.7		0.1	12.7		0.1	12.8	
11/29/85	BN 447151	12.5			12.2		0.3	12.5	
11/29/85	RRRX 3146	12.7		0.1	12.4		0.4	12.8	
11/29/85	BN 439240	12.3		0.1	12.2		0.2	12.4	
11/29/85	CBQ 184840	12.4		0.4	12.4		0.4	12.8	
12/2/85	C 552 Barge	13.8		0.2	13.7		0.3	14.0	
12/2/85	NAHX 800506	12.8	0.1		12.5		0.2	12.7	
12/2/85	SOO 71283	12.7		0.3	12.3		0.7	13.0	
12/2/85	NAHX 485344	12.5		0.2	12.4		0.3	12.7	
12/2/85	SOO 71155	12.6	0.2		12.0		0.4	12.4	
12/2/85	DR 10150	12.5		0.2	12.2		0.5	12.7	
12/2/85	NAHX 800529	12.5		0.1	12.5		0.1	12.6	
12/2/85	NAHX 478079	12.4		0.3	12.2		0.5	12.7	
12/2/85	SOO 70839	12.6	0.2		12.0		0.4	12.4	
12/2/85	SOO 3169	12.3		0.3	12.1		0.5	12.6	
12/2/85	GNWR 30020	12.3		0.2	12.1		0.4	12.5	
12/2/85	MILXN 101121				11.9		0.5	12.4	
12/2/85	XTRX 75023	12.7	0.2		12.1		0.4	12.5	
12/2/85	MILXN 100793	12.5			12.5			12.5	
12/2/85	SOO 33143	12.5	0.1		12.2		0.2	12.4	
12/3/85	SOO 74908	12.5			11.8		0.7	12.5	
12/3/85	SOO 75286	12.5		0.5	12.4		0.6	13.0	
12/3/85	SOO 76571				12.3		0.3	12.6	
12/3/85	LEF 80014	12.6			12.1		0.5	12.6	
12/3/85	SOO 74387	12.6		0.2	12.3		0.5	12.8	

F/O ______ INSP. AGENCY ______ DATE ______

LI/ACG ______ GRAIN FACTOR HARD RED SPRING

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
12/3/85	DR 10495	12.4		0.3	12.1		0.6	12.7	
12/3/85	SOO 73223	12.4		0.1	12.0		0.4	12.5	
12/3/85	SOO 72289	12.7			12.3		0.4	12.7	
12/3/85	SOO 81227	12.7		0.2	12.5		0.4	12.9	
12/3/85	NAHX 478366	12.3		0.1	12.1		0.3	12.4	
12/3/85	SOO 72925	12.2		0.1	12.1		0.2	12.3	
12/3/85	TCAX 60025	12.7			12.4		0.3	12.7	
12/3/85	SOO 74258	12.2		0.2	12.2		0.2	12.4	
12/3/85	DR 10291	12.5			12.1		0.4	12.5	
12/3/85	MILXN 10147	12.5			12.5			12.5	
12/3/85	SOO 75477	12.3		0.1	12.1		0.3	12.4	
12/3/85	NANX 56435	12.2		0.2	12.2		0.2	12.4	
12/3/85	SOO 75123	12.5		0.2	12.1			12.7	
12/3/85	SOO 75574	12.5		0.1	12.2		0.4	12.6	
12/3/85	SOO 72813	12.2		0.1	11.8		0.5	12.3	
12/3/85	SOO 75403	12.4		0.1	12.0		0.5	12.5	
12/3/85	SOO 74775	12.2		0.6	12.1		0.7	12.8	
12/3/85	SOO 74474	12.7		0.3	12.5		0.5	13.0	
12/3/85	SOO 88694	12.5		0.6	12.5		0.6	13.1	
12/3/85	NAHX 53795	12.7			12.6		0.1	12.7	
12/3/85	SOO 75225	11.9		0.8	12.0		0.7	12.7	
12/3/85	SOO 33189	12.6	0.1		12.3		0.2	12.5	
12/3/85	SOO 3183	12.3		0.4	12.1		0.6	12.7	
12/3/85	SOO 75440	12.6			12.2		0.4	12.6	
12/3/85	MILW 101478	12.3		0.7	12.3		0.7	13.0	
12/3/85	MILXN 100262				12.1		0.4	12.5	
12/3/85	NAHX 475311	12.4		0.3	12.2		0.5	12.7	

F/O ______________ INSP. AGENCY ______________ DATE ______________

LI/ACC ______________ GRAIN FACTOR HARD RED SPRING

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
12/3/85	SOO 74458	12.3		0.1	12.0		0.4	12.4	
12/3/85	SOO 88288	12.5			12.4		0.1	12.5	
12/3/85	MILW 100271	12.2		0.8	12.2		0.8	13.0	
12/3/85	SPEC 1031	12.5			12.4		0.1	12.5	
12/3/85	SOO 74567	12.3		0.3	12.0		0.6	12.6	
12/3/85	SOO 74832	12.2		0.3	12.0		0.5	12.5	
12/3/85	SOO 73599	12.2		0.6	12.1		0.7	12.8	
12/3/85	XTRX 76939	12.2		0.5	12.2		0.5	12.7	
12/3/85	XTRX 75139	12.2		0.5	12.0		0.7	12.7	
12/3/85	SOO 3211	12.2		0.3	12.2		0.3	12.5	
12/3/85	SOO 73976				12.1		0.2	12.3	
12/3/85	SOO 75563	12.6			12.4		0.2	12.6	
12/3/85	SOO 72161	12.0		0.6	11.9		0.7	12.6	
12/3/85	SOO 73665	12.5			12.5			12.5	
12/3/85	DR 10030				12.6		0.1	12.7	
12/9/85	FLIX 2081	15.9		0.2	16.0		0.1	16.1	
12/9/85	HONX 1020	15.9		0.4	16.0		0.3	16.3	
12/9/85	BN 452276	15.7		0.4	16.0		0.1	16.1	
12/9/85	BN 458494	15.7		0.6	16.0		0.3	16.3	
12/9/85	SLSF 79370	16.4		0.2	16.3		0.3	16.6	
12/9/85	RREX 4011	15.7		0.7	16.1		0.3	16.4	
12/9/85	BN 448916	15.8		0.6	16.0		0.4	16.4	
12/9/85	BN 455941	15.9		0.4	16.0		0.3	16.3	
OLYMPIA	343 samples						0.312		
PORTLAND	31 samples						0.174		
COMBINED	374 samples						0.267		
OC TO KJ	199 samples							[illegible]	

F/O Olympia/Portland INSP. AGENCY ______ DATE ______

XXXXXX P = Portland GRAIN FACTOR HARD RED WINTER

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACC RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
P 9/17/85	Barge 550	12.9			13.0	0.1		12.9	13.0
9/25/85	SLSF 86559	10.9		0.2	10.9		0.2	11.1	
9/25/85	SCOX 1544	11.3			10.9		0.4	11.3	
9/25/85	RREX 4125	11.4		0.3	11.1		0.6	11.7	
9/25/85	BN 461365	11.1		0.2	11.1		0.2	11.3	
9/25/85	NP 75672	11.1		0.1	10.9		0.3	11.2	
9/25/85	SLSF 79007	11.7		0.1	11.7		0.1	11.8	
9/25/85	PVGX 1058	11.6	0.3		11.4	0.1		11.3	
9/25/85	ABIX 174	11.1	0.1		10.8	0.4		11.2	
9/25/85	NAHX 481804	11.6			11.4		0.2	11.6	
9/25/85	BN 453246	11.6			11.4		0.2	11.6	
9/25/85	BN 456287	10.8			10.6		0.2	10.8	
9/25/85	PLGX 22545	11.9		0.2	11.8		0.3	12.1	
9/25/85	BN 448650	11.1		0.2	10.9		0.4	11.3	
9/25/85	BN 448868	11.3		0.1	11.1		0.3	11.4	
9/25/85	BN 454833	12.1			12.0		0.1	12.1	
9/25/85	USLX 20682	11.1			10.8		0.3	11.1	
9/25/85	ACFX 48326	11.1		0.1	11.0		0.2	11.2	
9/25/85	PVFX 732	10.8		0.2	10.8		0.2	11.0	
9/25/85	BN 450913	11.8			11.3		0.5	11.8	
9/25/85	BN 446301	11.0		0.3	11.1		0.2	11.3	
9/25/85	CBQ 86147	11.4		0.1	11.2		0.3	11.5	
9/25/85	HONX 1018	11.2		0.4	10.8		0.8	11.6	
9/25/85	FWD 459694	11.5			11.3		0.2	11.5	
9/25/85	BN 449107	11.6		0.1	11.5		0.2	11.7	
9/25/85	BN 447167	11.5		0.1	11.3		0.3	11.6	
9/25/85	GTAX 20139	11.4		0.1	11.2		0.3	11.5	

F/O ______________ INSP. AGENCY ______________ DATE ______________

LI/ACG ______________ GRAIN FACTOR HARD RED WINTER

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACG RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
9/25/85	BN 460304	11.7		0.2	11.7		0.2	11.9	
9/25/85	NP 76314	11.5		0.2	11.4		0.3	11.7	
9/25/85	BN 458618	11.8		0.4	11.8		0.4	12.2	
9/25/85	NP 76144	11.2		0.2	11.2		0.2	11.4	
9/25/85	BN 460395	11.6		0.1	11.4		0.3	11.7	
9/25/85	BN 455573	11.4		0.3	11.5		0.2	11.7	
9/25/85	CRDX 8607	12.1		0.3	11.4		0.4	11.8	
9/25/85	BN 445110	11.5		0.1	11.2		0.2	11.4	
9/25/85	GN 172378	11.4		0.1	11.2		0.3	11.5	
9/25/85	BN 447460	11.5		0.2	11.1		0.6	11.7	
9/25/85	BN 461057	11.7		0.1	11.6		0.2	11.8	
9/25/85	CGCX 20525	11.3		0.3	11.3		0.3	11.6	
9/25/85	SLSF 81106	11.6			11.3		0.3	11.6	
9/25/85	TILX 510219	11.4		0.1	11.2		0.3	11.5	
9/25/85	BN 446028	11.4		0.2	11.4		0.2	11.6	
9/25/85	BN 451373	11.4		0.3	11.1		0.2	11.2	
9/25/85	BN 460472	11.5		0.2	11.2		0.1	11.3	
9/25/85	BN 447571	10.4		0.1	10.1		0.4	10.5	
9/25/85	BN 449312	11.8		0.2	11.6		0.4	12.0	
9/25/85	CBQ 185094	10.6		0.4	10.7		0.3	11.0	
9/25/85	BN 458579	11.7		0.1	11.3		0.3	11.6	
9/25/85	BN 461159	10.7		0.2	10.5		0.4	10.9	
9/25/85	NAHX 481906	11.1			11.0		0.1	11.1	
9/25/85	BN 460328	11.0		0.2	11.0		0.2	11.2	
9/25/85	BN 461539	11.6	0.1		11.3		0.2	11.5	
9/25/85	BN 457450	12.0		0.2	11.6		0.2	11.8	
9/25/85	CBQ 85888	11.5		0.2	11.6		0.1	11.7	

F/O ______________ INSP. AGENCY ______________ DATE ______________

LI/ACG ______________ GRAIN FACTOR HARD RED WINTER

DATE	IDENTIFICATION	LI RESULTS	+ %	- %	ACC RESULTS	+ %	- %	BAR RESULTS	KJELDAHL
9/25/85	BN 457401	12.1		0.1	12.0		0.2	12.2	
10/11/85	GTAX 20359	11.9		0.2	11.7			11.7	

CODES: F (Foreign Complaint) A (Appeal)
S (Supervision) O (Opinion)

Protein = NIR Pro x (100-Mot M / (100-NIR M

CODE	DATE	IDENTIFICATION	LOCATION	WHEAT CLASS	ORIGINAL MOIST. RESULT	ORIGINAL PROT. RESULT	APPEAL/SUPV MOIST. RESULT	APPEAL/SUPV NIR PRO/MST	APPEAL/SUPV PROT. RESULT	BOARD OF APPEALS & REVIEW MOIST. RESULT	RACK NO.	NIR PROTEIN 400.	NIR PROTEIN 31	NIR MOISTURE 400	NIR MOISTURE 31	FINAL PROTEIN RESULT	QCTB KJELDAHL UNCORR/CORR	QCTB AIR OVEN	REMARKS
A	09/24	CS 868	OLY	HRS	13.2	12.9	13.0		12.8	13.3	001 A	12.50		11.2		13.2	13.5		
											002 B	13.59		11.3					
										86.7 x 13.54				÷ 88.75		= 13.22			[illegible]
✓	✓	NAHX 47966	✓	HRS	13.0	13.0	13.1		12.8	13.5	003 A	13.71		11.3		13.3	13.6		
											004 B	13.53		11.3					
										86.5 x 13.62				÷ 88.7		= 13.28			Yell. 512
✓	✓	CW 171549	✓	HRS	13.2	13.1	13.3		12.8	13.4	005 A	13.42		11.3		13.1	13.5		
											006 B	13.49		11.4					
										86.6 x 13.46				÷ 88.65		= 13.14			Yell. – 513
✓	✓	RRRX 1058	✓	HRS	13.1	13.1	13.3		-.2 12.9	13.5	007 A	13.36		11.4		13.0	13.4		
											008 B	13.33		11.5					
										86.5 x 13.34				÷ 88.55		= 13.03			Yellow 514
✓	✓	TRNX 500294	✓	HRS	13.3	12.8	13.3		0 12.8	13.7	009 A	13.10		11.8		12.8	13.2		
											010 B	13.02		11.7					
										86.3 x 13.06				÷ 88.25		= 12.77			Yell 515
✓	✓	NAHX 481846	✓	HRS	13.3	13.2	13.3		3 12.9	13.6	011 A	13.45		11.6		13.2	13.6		
											012 B	13.61		11.6					
										86.4 x 13.53				÷ 88.4		= 13.22			Yellow 516
✓	✓	CAGX 285	✓	HRS	13.5	13.2	13.1		-2 13.1	13.4	[illegible] A	12.50		11.7		13.3	13.7		
											014 B	13.69		11.5					
										86.6 x 13.60				÷ 88.4		= 13.32			Y[illegible] 51[illegible]

Attachment 3

Protein Meeting
January 14, 1986-Rm. 1634-S
January 15, 1986-Rm. 1331-S
Washington, DC

Following is a chronological listing of events of the protein appeal problem between the west coast and the Quality Control and Testing Branch (QCTB). Please review and provide your written comments to Homer Dunn by 9:00 a.m. on January 15, 1986. You should give:

1. What you believe caused the problem. Base this on facts if possible.
2. What changes can be made to strengthen the protein program.
3. What can be done to prevent a recurrence of this problem.

9-18-85	Olympia biased instrument +.15.
9-20-85	Five Olympia monitor samples read +.06 to QCTB NIR.
9-20-85 thru 10-10-85	Olympia averaged -.17 percent protein on monitor samples compared to QCTB NIR. During this interval, QCTB NIR was +.05 to +.10 to Kjeldahl, so no action was taken!
9-26-85	Board appeal results showed substantial differences on the plus side to Olympia. This continued until at least December 9, 1985.
9-29-85	Five Olympia monitor samples showed -.12 to QCTB NIR.
10-8-85	Five Olympia monitor samples showed -.10 to QCTB NIR.
10-9-85	Five Olympia monitor samples showed -.37 to QCTB NIR.
10-10-85	Two Olympia monitor samples showed -.31 to QCTB NIR.
	QCTB stated data to this point were insufficient for corrective action to be taken.
10-12-85	Lloyd Brown reported to Guy Morgan that there was a protein problem on appeal samples between Olympia and QCTB. Olympia was running considerably lower than QCTB. The director's office became involved in this problem at this point. A number of discussion followed and continue to this day.
10-15-85	QC T400 vs DJ showed no instrument difference on Board appeals (to .01 percent protein).

10-15-85	QCTB did not enter information of major importance to this problem at this location: (1) The new Technicon 400 instrument was put in use at QCTB. A bias was necessary and should have been explained; (2) new SRS were put in use at QCTB; and (3) the Kjeldahl titrator had been malfunctioning and was corrected which is believed to have had a relationship to the low 14.97 SRS value originally issued from QCTB.
10-23-85	Olympia monitor samples showed -.03 to QCTB NIR.
10-23-85 thru 11-16-85	Olympia averaged -.17 percent protein on monitor samples compared to QCTB NIR during this interval, QCTB NIR was -.03 to Kjeldahl. Investigation was initiated.
10-30-85	Five Olympia monitor samples showed -.17 to QCTB NIR.
11-5-85	QCTB issued Kjeldahl values of 14.97 for new SRS. New SRS not used by Olympia until 11-25-85.
11-12-85	Collaborative using QCTB SRS showed Olympia -.14 percent protein compared to QCTB KJ.
11-14-85	Sixteen appeal BAR results +.5 above Olympia. L. Brown discussed with L. Arnold on November 15, 1985.
11-15-85	L. Brown and W. Brookreson discussed BAR protein results with J. Marshall.
11-16-85 thru 12-18-85	Olympia averaged -.23 percent protein on monitor samples compared to QCTB NIR.
11-21-85	L. Brown asked QCTB not to run Board appeals until we had corrected problem, approximately 150 cars involved.
11-25-85	Olympia began using 14.97 SRS value.
11-25-85	QCTB requested variety determination of appeal samples and Olympia's SRS by the BAR. Found that appeal samples consisted of about 80 percent Marshall variety, and that none of Olympia's SRS included this variety. There remains a question as to how many monitoring samples consist of the Marshall variety. Also what were the results of those appeal samples that were not of the Marshall variety?
11-27-85	QCTB rechecked SRS samples from Portland, Olympia, Moscow, and Vancouver and issued new value 15.12 (net effect would raise protein by Olympia +.15 percent). Moscow and Grand Forks Field Offices requested to obtain wheat samples for new SRS.
11-27-85	Portland and Olympia were asked to double the number of HRS monitor samples.

11-27-85	Reflectance values obtained for typical Board appeals did not correlate well with similar samples comprising the current HRS calibration set (all five filter readings on I/A 400 were low).
11-27-85	QCTB asked L. Brown if Board appeals could be run. L. Brown was assured by QCTB that problem was solved and QCTB proceeded with Board appeals. H. Dunn asked for a letter explaining problem.
11-29-85 12-2-85	Olympia was -.4 to -.5 percent protein on Board appeals and +1.0 percent on Motomco moisture (moisture difference alone can account for -.2 percent protein).
12-4-85	QCTB issued new average for five SRS to be used (15.45), based on same Kjeldahl numbers used for 11-27-85 average (net effect would raise protein by Olympia another +.15 percent). Note: This has not been used.
12-6-85	Gary Wasson was asked to collect replacement SRS in the range 11.5 percent to 16.5 percent protein.
12-12-85	A meeting was set for January 14, 1986, to discuss problem on the West Coast.
12-12-85	New SRS 15.12 put into effect at direction of H. Dunn. A meeting was scheduled for January 14, 1986, to discuss problem.
12-16-85	Portland Field Office was -.20 percent protein on two appeals compared to QCTB NIR.
12-17-85	Special collaborative between Olympia, Portland Field Office, and QCTB showed Olympia to be -.01 percent and Portland Field Office to be +.05 percent protein compared to QCTB NIR.
12-19-85 thru 12-30-85	Olympia averaged -.12 percent protein on monitor samples compared to QCTB NIR.
12-30-85	Olympia was -.10 percent protein on one appeal compared to QCTB NIR.
1-6-86	New crop reflectance data (T400/DJ GAC-III) submitted to Larry Freese for verification and/or updating of calibrations.

Attachment 4

Protein Problems West Coast

Statements made as to cause of the west coast protein problem.

1. High moisture causes low NIR readings.
2. Wheat varieties are a cause of the problem.
3. Only wheat from Minot, North Dakota, is a problem, other grain in the market is not.
4. The SRS samples are not stable. This caused us a problem with original value.
5. QCTB Kjeldahl is off. Therefore, QCTB is off on their results.
6. New crop wheat is a problem. Each year for approximately 3-4 months after harvest, we have this problem, from then on all goes well.
7. Kjeldahl protein results change with the season — up in the winter and down in the summer.
8. Frost damaged wheat may be cause of problem.

C. ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

January 24, 1986

To: Homer E. Dunn, Deputy Director, Field Management Division

From: William E. Brookreson, Grain Inspection Program Supervisor, WSDA Bill

RE: Protein Meeting Followup

As a result of the discussions and agreements at our meeting of January 14 and 15, our Department has taken the following steps:

1) Seven market samples of Hard Red Spring Wheat have been provided to Portland Field Office and QCTB as a part of the collaborative protein bias check. Each of the protein operators in the Olympia lab will make determinations on the protein values of the 21 sample set and the results will be immediately provided to QCTB.

2) Both Olympia and Vancouver will increase the number of Hard Red Winter Wheat monitoring samples to QCTB to determine if we have a problem developing with Hard Red Winter protein values.

3) The N.I.R. moisture tolerance will be reduced from ±.5% to ±.15% immediately.

4) I have instructed our protein coordinator, Art Choate, to gather the information on the apparent seasonality of QCTB Kjeldahl. This will be forwarded. Dr. Watson's assurance that the new facility will rectify this problem relieves one of our concerns.

5) In consultation with Larry Arnhold of QCTB we are modifying the current monitoring system slightly to limit sample variation and provide more direct machine comparisons and we will be implementing a system of "referee" samples on a trial basis, much like that contemplated in the forthcoming instructions, to check its effectiveness, work out any system problems and provide us a more uniform basis of comparison.

6) I have prepared a memo to Dr. Watson encouraging the formulation of an Early Alert program (copy attached). In this area I think the input from the Board of Appeals is particularly useful because of their field experience and exposure to grain problems through the GIMS and Board Appeal process.

We will continue to provide samples and/or information to QCTB, as requested, in the efforts to resolve their problems.

I want to express my personal appreciation for the opportunity to participate in the meeting in Washington. As the representative of an official agency I realize this type of input is not usual. I feel that this is one of the most positive aspects of our Federal/State arrangement. The meeting was a very productive first step in improving the overall program. The frank exchange brought out some structural problems that we can now address as well as areas we are moving to improve. I will confess a considerable impatience to resolve the problems, especially on the calibrations, and we will do whatever we can to help.

The impatience should not be misconstrued. I think that Larry Arnold is a very capable young man who, with some more experience, will do an excellent job. I think he is as committed as we are to a quality program and will do what must be done to assure it.

attachment

C. ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg. AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

January 24, 1986

To: Dr. C. A. Watson, Chief, QCTB

William E. Brookreson

From: William E. Brookreson, Grain Inspection Program Supervisor, WSDA

RE: Protein, Early Alert

As we discussed at our meeting in Washington D.C., we feel that an "early alert" program in NIR protein would be extremely useful in early identification and resolution of problems. Wheat varieties and/or wheat produced under unusual growing conditions such as the high moisture Hard Red Spring out of the Minot area could be pinpointed as not aligning well between Kjeldahl and NIR instruments.

The idea would be very similar to that used for the "early alert" program administered by the Board of Appeals and Review (BAR). Each Field Office Manager (FOM) would be responsible to provide one or more samples to QCTB of wheat that represented a significant new variety in his circuit, that was produced under unusual growing conditions, or that is for some other reason suspect. For example: Our Pasco office has received a significant number of very high protein samples of Hard Red Spring Wheat produced under very dry conditions and is now receiving a large number of lower protein, irrigated Hard Red Spring samples. In both of these areas we suspect we have serious alignment problems with Kjeldahl. The BAR's experts would certainly be useful in the process not only by identifying potential problem samples from the GIMS and Appeals Program but also because of their experience over several years with the grain early alert program.

Samples received would be used as referee samples throughout the potential marketing area to pinpoint the problems as early as possible. This type of program should enable us to identify problems and develop strategies for dealing with them before they reach crisis proportions.

cc: Homer Dunn
Arnie Class

[illegible]
Director

STATE OF WASHINGTON
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406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

January 28, 1986

To: C. A. Watson
Branch Chief
Quality Control Testing Branch

From: W. E. Brookreson WEB
Grain Inspection Program Supervisor
Washington State Department of Agriculture

RE: Protein Procedures - Comments

It was our understanding at the January 14-15 meeting in Washington D.C. that a work group was to be established to evaluate this procedure before anything was to be considered. We are disappointed that this proposal came out as a "write-up" of the proposal procedure without prior discussion. The proposal concerning the biasing procedure for NIR protein is ill-advised at best.

The basic premise of the procedure is that, as the moisture of the ground sample changes the NIR protein result will change accordingly however, the converted protein figure will remain constant. If the intent is to correct inappropriate biasing of the instrument than we believe it falls short of that goal. However desirable this may sound, it operates on a basically false assumption, that machine drift on moisture values can be segregated from sample drying in day to day testing. Paragraph one of the instruction states that "The NIR instruments shall be biased using the NIRP and NIRM results." The working hypothesis in the field must be that baseline NIR moisture values established by QCTB are accurate, that deviations from the established baseline figure are the result of machine drift, and that deviations from the baseline are to be corrected by rebiasing the machine. In other words, once the 9.3% moisture is established, the NIR instrument will be biased to read 9.3% unless and until a new air-oven value is established.

In addition to this, standard reference samples are stored, in all our facilities, in sealed containers. We have no evidence of reference samples, even those several years old, having lost moisture.

In practice, each NIR instrument gives two individual readouts, NIR moisture and NIR protein. To plug these two figures into the formula and arbitrarily decide to adjust one NIR protein on the basis of the answer makes very little sense to me. The procedure increases rather than decreases the chance of error and can and, I believe, will result in over biasing or incorrect biasing of the instrument. As a consequence, I strenuous object to the implementation of this procedure on NIR reference samples.

The conversion to a fixed moisture basis does have advantages in any system of referee samples because it provides a fixed basis for comparing different instruments set with different reference samples. I would encourage the use of 10% or 13.5% in these kinds of exercises. That is much different than adjusting an individual machine NIR protein or moisture readout.

In addition, we have some concerns about the guidelines established in paragraph one regarding when testing is to be suspended. These guidelines are not realistic until the calibration constants are corrected and updated. At least on the Dickey-John instruments, we believe there is a definite slope problem in comparison to Kjeldahl.

cc: Homer Dunn
Gary Wasson
Lloyd Brown
Larry Arnold
Bill Shuey

United States
Department of
Agriculture

Federal Grain
Inspection
Service

Washington,
D.C.
20250

March 27, 1986

Mr. William E. Brookreson
Grain Inspection Program Supervisor
State of Washington
Department of Agriculture
406 General Administration Building, AX-41
Olympia, Washington 98504

Dear Bill,

I have reviewed the information contained in your letter regarding protein operators, monitoring methods, and the Dickey-john calibration study. I hope the following comments assist you in your protein testing program.

A calibration study for Dickey-john equipment has not been organized by FGIS at this time. Current Dickey-john calibration constants are considered reliable, but a joint study is expected in the future. Your offer to assist in this project will be considered during the initial planning stage.

Your pilot program for assigning protein operators individual "slots" in the NIR instrument is a concept worth evaluating. The program's advantages noted in your correspondence maintain instrument accuracy while improving the operator's confidence in the equipment. Although the pilot program illustrates improved instrument stability, daily reference sample checks must be completed as required.

A good protein monitoring program should determine the accuracy of instruments and operators. The experimental monitoring system implemented by your office determines instrument accuracy. A random selection monitoring system should also be established to determine operator accuracy. Information provided from both monitoring systems would pinpoint problems as they occur in daily operations and dictate required corrective action.

I appreciate your enthusiasm demonstrated by your efforts to improve the protein testing program. Accurate protein results are essential for grain marketing in your area and throughout the nation.

Thank you for your input and comments regarding the protein testing program.

Sincerely,

Homer E. Dunn

Homer E. Dunn, Acting Director
Field Management Division

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C. Alan Pettibone
Director

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March 11, 1986

To: Homer Dunn, Deputy Director, Field Management Division

From: William E. Brookreson, Grain Inspection Program Supervisor

RE: Protein Operators

One of the areas we discussed at the meeting in Washington D.C. was means to more closely control and monitor individual operator bias differences on the NIR protein analyzers. As a result of that discussion, we have implemented a pilot program in the Vancouver and Olympia grain offices. Under this program, each operator has been given his/her own slot in the machine.

As you are aware, our standard machine is the Dickey-John Instalab 800 that has been interfaced with the HP 85 computer. With the computer interface, each instrument has a capacity of 500 products which provides more than ample room for each operator to have a "slot" for each grain for which official determinations are made. The systems are supervised in Vancouver by Dan Voyles and in Olympia by Art Choate, two of our finest and most experienced protein technicians.

We know that protein analyzers may vary slightly from machine to machine in slope and stability. We know also that individual operators will vary slightly in their biases, often for reasons we cannot determine. The NIR protein analyzer is biased to the individual operator so that there is no absolute right or wrong but there are determinable differences. By assigning each operator a separate slot it acts as if each operator is on a separate machine biased to his/her our performance characteristics.

We see three advantages to the system: (1) When the operator with his own bias, we have much more stability in the machine. We have fewer bias adjustments. (Excessive bias charges in our experience, tend to destabilize the instrument). (2) It provides much more ability to trade individual performance as separate from machine drift. (3) We have better and more consistent results. The only difficultly we foresee is assuring that the operators are in the proper slot.

We have also, as we previously notified you, implemented an experimental monitoring system like that suggested by the QCTB personnel in the Washington meeting. We are sending five samples of each class to each location as a monitor of "real world" samples as opposed to the SRS. We are not very satisfied with the results. The system shows the same operating characteristics as the SRS samples in that they agree very well. It tells us much less about the day to day operation of the program than the system of random selections. Monitoring samples sent out from Olympia are by nature biased in that the operator knows before he runs the sample that his results will be scrutinized. The mailout program, essentially, provides us too little information. We will, however, continue the program and monitoring of results to verify our initial impressions. Based on these, we would not recommend that as the standard system of monitoring.

I apologize for not getting the information to you on the seasonality of the Kjeldahl. Both Lloyd and I assumed the other had sent it. The results we received for reference samples were:

HRS	7-23-84	15.11	base
	2-07-85	15.22	(+.11)
	7-08-85	15.09	(-.13)
	11-20-85	15.38	(+.29)
HRW	11-27-84	13.26	base
	2-07-85	13.18	(-.08)
	8-21-85	13.02	(-.16)

We have not yet received any information from QCTB about the method for inputting samples for a Dickey-John calibration study. We remain concerned about the validity of the Dickey-John and Technicon calibrations and about how well the results of the infranet study are transferrable to our instruments.

In general the comparison between Olympia and QCTB seems to be looking better. We hope to receive more direction soon to improve that.

cc: Lloyd Brown
Cliff Watson

C.Alan Pettibone
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504

Date: May 2, 1986

To: Homer Dunn, Deputy Director, Field Managment Division

Bill Brook

From: Bill Brookreson, Grain Inspection Program Supervisor, WSDA

RE: Durum Protein Values

Attached are three sets of values from QCTB for our Durum Protein reference samples. The results are for the same samples and show an all-to familiar pattern:

DATE	PROTEIN	MOISTURE
3/22/84	13.83	11.15
4/12/85	14.03	10.80
4/25/86	14.18	10.80

Somehow the samples have gained .35 in protein in two years. We have a durum cargo in Vancouver waiting for a ship. QCTB called for a new set of durum test samples sent 3-19-86. On 5-1-86 we called and asked for results and got the 14.18 value. In the interum Vancouver had a twenty-five car unit train of durum on 4-26-86. QCTB, although they felt the results were not accurate, felt no need to give a timely response. I continue to be disappointed in their commitment to have an effective, timely program.

cc: Lloyd Brown
Bill Shuey

Attachment

[illegible]

FROM: Quality Control & Testing Branch

SUBJECT: Known Protein Reference Values

The reference samples below have been reviewed by the Quality Control & Testing Branch and found to have the below listed known values. The field office and original location using the below set of samples shall bias and refer daily to these results when reviewing NIR instruments for accuracy.

F/O Portland, OR Date Established 3-22-84

Class DU

SAMPLE NO.	NIR PROTEIN	NIR MOISTURE
1	12.09	11.32
2	12.16	11.34
3	12.33	11.42
4	13.04	11.48
5	12.99	11.44
6	13.77	11.32
7	14.77	11.26
8	15.02	11.24
9	16.14	10.32
10	15.98	10.40
REFERENCE AVERAGE	13.83	11.15

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Agriculture

Service

Quality Control & Testing Branch
Richards-Gebaur AFB
Building 221
Grandview MO 64030

TO: Art Choate

FROM: Quality Control & Testing Branch

SUBJECT: Known Protein Reference Values

The reference samples below have been reviewed by the Quality Control & Testing Branch and found to have the below listed known values. The field office and original location using the below set of samples shall bias and refer daily to these results when reviewing NIR instruments for accuracy.

F/O Olympia

Date Established 4/12/85

Class DU

SAMPLE NO.	NIR PROTEIN	NIR MOISTURE
1	12.22	10.98
2	12.16	10.83
3	12.50	11.05
4	13.20	10.94
5	13.41	10.99
6	13.88	11.04
7	14.88	11.07
8	15.29	10.82
9	16.40	10.09
10	16.35	10.22
REFERENCE AVERAGE	14.03	10.80
Call 5-1-86	14.18	10.80

United States
Department of
Agriculture

Federal Grain
Inspection
Service

Quality Control & Testing
Richards-Gebaur AFB
Building 221

TO: Lloyd Brown

FROM: Quality Control & Testing Branch

SUBJECT: Known Protein Reference Values

The reference samples below have been reviewed by the Quality Control & Testing Branch and found to have the below listed known values. The field office and original location using the below set of samples shall bias and refer daily to these results when reviewing NIR instruments for accuracy.

F/O Olympia

Date Established 4/25/86

Class DU

SAMPLE NO.	NIR PROTEIN	NIR MOISTURE
1	12.30	10.82
2	12.48	10.90
3	12.63	10.98
4	13.31	10.88
5	13.34	10.88
6	14.09	11.27
7	15.08	11.04
8	15.43	10.92
9	16.55	10.02
10	16.56	10.26
REFERENCE AVERAGE	14.18	10.80

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C. ALAN PETTIBONE
Director

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DEPARTMENT OF AGRICULTURE
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June 2, 1986

To: A.A.G.I.W.A. Protein Committee

From: Bill Brookreson

RE: Kansas City Protein Meeting

Attached is a copy of my letter to John Marshall as follow-up to the protein meeting at QCTB on May 20. I would be interested in knowing your feelings about the meeting and being copied on any follow-up you may have to the meeting. Thanks.

C. ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

May 23, 1986

Mr. John Marshall, Director
Field Management Division, USDA/FGIS
1641 South Building
1400 Independence Avenue SW
Washington, D.C. 20250

Dear John:

Thank you for the opportunity to participate in the protein meeting on May 20, 1986 at QCTB. I am encouraged that the directions set forth at the meeting will result in a praxis that will put us on the road to a solution to the current protein differences. I also want to congratulate you on your handling of the meeting and your ability to keep the focus on positive solutions to problems rather than on complaints.

My staff and I look forward to reviewing the forthcoming protein instructions in some detail. In its preparation, there are some points discussed at the meeting upon which we would like to elaborate, or restate, our position as an Agency.

(1) Fresh Grind vs. Weekly Grind of SRS Samples. We have offices using both systems at the present time and we can detect no appreciable differences, unless some other condition changes. Our supervision personnel prefer the weekly grinding because: (a) it expedites the testing of the machine; (b) use of the flour provides a more stable basis for checking machine drift because it minimizes sample differences; (c) it preserves the SRS samples longer. There are some conditions, however, that should always mandate use of a fresh grind: (a) change in operators (each operator should grind fresh weekly); (b) a bias adjustment to the machine; (c) any change in the grinder (screen, impeller, belts, or grinding ring) or the sample cup; (d) anytime the operator feels the ground samples are no longer representative. When checking the instrument, grinding and packing should be done by one operator.

(2) Cleaning the Lens. We feel that cleaning the lens with a lint free tissue should be done weekly, except under exceptionally heavy use, because the cleaning of the lens destabilizes the instrument requiring some hours for it to restabilize and provide reliable and consistent readings. For this reason also, we feel that cleaning should be at the end of a shift. Preferable when no determinations are to be made for some hours. The instructions should stress careful cleaning of the cup and drawer to minimize contamination of the lens. Good operator practices will make one cleaning per week quite adequate.

(3) Environment. We feel that control of the environment is very important to consistency. Temperature control is critical. The ± 5 currently provided in the instructions is probably excessive, although the practicality at a tightened guideline might be questioned. We do note a change in results before the current guideline is violated. Humidity should also be controlled to protect the integrity of the SRS samples and the repeatability of the instrument. I can only support Gary Wasson's suggestion that every NIR be on a voltage regulator as well as a dedicated line.

(4) When to Bias the Machine. (a) We feel strongly that the NIR should be biased any time it deviates more than ±.15 from the established SRS baseline. (b) The bias adjustment should be done immediately by the operator before any official samples are run and the field office notified. (c) All bias adjustments should be made to the baseline values. (d) The machine should also be rebiased if a clear trend of high or low reference values is shown by the records. For example, if a machine is +.10, +.12, and +.11 on consecutive days it should be rebiased to the baseline. This will require some judgement by the operator to prevent excessive rebiasing of the machine or rebiasing when the differences are insignificant. I would suggest a guideline such as 3 consecutive days that differed from the baseline by ± .1 or more. (e) NIR moisture tolerances of ±.5 are too great, these should be reduced to ±.15. (f) Careful and complete records of machine bias must be maintained at both the local office and the field office and be reviewed to detect machine behavior problems.

(5) Sealed Check Cells. The use of sealed check cells in place of SRS samples to check machine bias should not be considered for several reasons: (a) sealed check cells will not detect and allow for correction for individual operator differences; (b) deterioration of sealed check cells is very difficult to detect; (c) sealed check cells are too expensive and easily damaged.

We do use sealed check cells - prepared locally - to warm up the instrument and to check machine behavior during a shift to supplement but not replace SRS samples. Prepared locally, they are inexpensive, easily replaced, and a good way to check for machine consistency. We feel they might also be appropriate for checking machine slope.

(6) Number and Originator of SRS Samples. As you are aware, I have serious reservations about the conclusions reached in this area. We continue to strongly advocate the use of 10 SRS samples rather than 5. We feel that normal machine variations have too great an impact on that small a universe of samples. We have used 5 for white wheat and durum in the past and we were not satisfied with the results. We have also submitted the same 5 samples to QCTB as an experiment control in consecutive months. The average difference far exceeds the ± .15 tolerance.

The intent of switching from 10 to 5 samples was to expedite the process of gathering and preparing the SRS reference samples. The result may very well be the opposite. The use of so small a number of samples makes each individual sample far more critical. A sample that may be an acceptable performer in a group of ten will not be in a group of 5. If the selection and preparation is done properly the sample will have to be mixed and prepared before it can be evaluated properly. With five samples a large number will have to be discarded as unacceptable. This becomes a particularly difficult problem at high and low protein ranges where performance of SRS samples tends to be more erratic anyway.

The possibilities of a "double run" should lessen but not eliminate the problem of inaccurate results and consequent excessive and unnecessary rebiasing of the instruments which tends to destabilize the machine. Gail Jackson's suggestion of one set composed to 5 HRW and 5 HRS samples used to check both products is definitely worth exploring as a possible middle ground.

I believe that an acceptable set of 5 reference samples is highly unlikely to be produced in any kind of timely way given the resources at QCTB and its past record of performance.

The use of one set of national reference samples originated and prepared by QCTB, in theory, is an excellent idea and would go a long way toward resolving the differences that currently exist. My reservations concern the lack of resources and expertise at QCTB in developing the samples. It is important that this system get in place in a reasonable time. Based on past experience, I have no confidence in the ability or will of QCTB to accomplish this goal. I feel that three or four sets of SRS samples, originated in the field, validated by QCTB and distributed under their direction is perhaps less desirable but infinitely more practical.

(7) Preparation of the SRS Samples. Proper preparation of the samples to produce the most homogeneous sample possible is critical.

(a) The sample should be a single variety. The suggestion by Willie Stephens for Lincoln Inspection Service to use certified seed is excellent and should be persued. We used mixed, market samples several years ago. In our opinion, they lack acceptable repeatability.

(b) The samples should be as homogeneous in protein value as can be obtained. The wider the range in the sample, the less repeatable.

(c) The samples should be selected that are essentially free of damage and foreign material.

(d) Every sample must be thoroughly mixed and cleaned using the Carter Dockage tester (The Kice aspirator may also prove very useful and much quicker) and examined to see if hand picking is needed.

(e) All samples should be cut from the bulk with an approved divider.

(f) Bulk samples as well as working samples should be stored with insect protection in air tight containers under controlled environmental conditions.

(g) Access should be carefully controlled.

(h) Every sample should be extensively checked for repeatability before it is submitted for Kjeldahl. An evaluation of 10 to 50 runs - all fresh grinds - should establish the repeatability.

(i) I am less convinced that the samples have to track exactly with Kjeldahl - especially with the ± .2 tolerance for a whole set which seems to be the current working hypothesis. I believe that a statistically valid correction factor can be added to compensate for any differences from perfect alignment, provided the samples have a high repeatability level, and greatly simplify the process of gathering samples.

(j) Once established the SRS reference values should be good for the life of the set. ESTABLISHED VALUES MUST NOT BE CHANGED. The game of biasing one office above and another below the baseline must not be allowed.

(8) Grinder Check Sample. This suggestion seems pointless. The SRS samples ground weekly should detect any long term deterioration of grinding ring, screens or impeller. Any other sudden changes will be obvious to the operator either in the use of the grinder or by visual examination when the grinder is periodically cleaned.

(9) Slope and Calibration. As you are aware, we believe that the NIR calibration constants currently used are incorrect and a calibration study will show that the constants need to be changed. We believe that it is critical that FGIS assume prime responsibility to assure that proper, vigorous calibration studies are performed. It makes no more sense to abrogate this responsiblity than to ignore soybean damage lines or any other quality factor that is necessary to have under control in order to expedite the trade in grain. No one else has the national resources available to do such a study. I personally feel that correction of the calibration constants should be the first step. Step 2 would be to adjust the slopes of individual machines to "fine tune" alignments. To have everyone perfectly congruent - all wrong - seems strange.

For fine tuning the slope, I think that a set, or sets, of sealed check cells might be a better system than 30 individual samples. The sealed check cells should prevent other variables from impacting machine slope. We have even seen grinders that have a slope problem for example.

(10) Monitoring. A good monitor system is critical to checking and maintaining individual performance. We experimented with a system of "referee" samples from our office to the field. We found that they gave no information not already provided by the SRS samples. A system modeled on the GIMS, using randomly selected samples, is best.

(11) Individual Slots. We feel that whenever an instrument has capacity, each operator should be in his own slot. That prevents unneeded

rebiasing of the machines when the differences are between operators. It also helps to track individual performance.

The points raised at the meeting, 1) good reference samples, with firm values, distributed over a wide area; 2) quick reponse to bias problems; 3) better communications; 4) finely tuned machines, should help considerably.

The key to the whole system remains at QCTB, however. We must have performance there in which we have confidence. The ±.2 on Kjeldahl sets of samples should not be acceptable. What this means is the possibility of a .4 change in values.. One set of SRS values, that are not changed, to standardize all instruments should help. Hopefully the new quarters will help too.

We need to put in the instructions how any change in baseline values will be announced and implemented. The current system of hit and miss management, capricious changes and non-changes just creates chaos in the marketing.

As I noted above, we are waiting expectantly for the instruction on protein testing and we will continue to follow all developments closely. It is my fervent hope that the solution to the protein problems will be one of our biggest accomplishments of 1986.

Sincerely yours,

William E. Brook

William E. Brookreson
Grain Inspection Program Supervisor

cc: Gail Jackson
Lloyd Brown
AAGIWA Protein Committee

AAGIWA Protein Committee Meeting
Kansas City, MO 11/19/86

At the suggestion of John Marshall the AAGIWA Protein Committee met at Quality Control and Testing Branch lab in Kansas City, Mo. Present were:

for AAGIWA
Gary M. Bothwell – Kansas
Ted Hoelik - Hastings Grain Inspection
W.L. Hutchings - Denver Grain Inspection
W.O. Stephens - Lincoln Inspection
Kevin Rea - Lincoln Inspection
Bill Brookreson - Washington

for FGIS
John Marshall - Washington, D.C.
John Giler - Washington, D.C.
Gail Jackson - Kansas City (Standardization)
Larry McDonald - Kansas City, F.O.
Diane Polacek - Kansas City, F.O.
Mike Eustrom - Omaha, F.O.
Ricky Kirk - Omaha, F.O.
C.A. Watson - QCTB
Anita Heckenbach - QCTB

The committee was convened to consider problems and progress since the May 16 meeting in Kansas City. Bill Brookreson, Chairman of the committee presided.

The meeting opened with participants given the opportunity to present what they saw as problems or progress. Kevin Rea (Lincoln Inspection) noted problems remaining with samples from the Aberdeen S.D. area that were consistently .5 to 1.0. This is a longstanding problem. Kevin also questioned the validity of the current calibration constants for HRS and HRW wheats given the varietal identification and characteristic problems of the new varieties. Bill Hutchings (Denver Inspection) also noted longstanding intermarket differences between Denver and West Coast export points. Bill pointed out that these differences had been lessened since July but that the raising of West Coast values had caused foreign market complaints. Bill questioned the value of the field offices in the monitoring system and a lack of emphasis in the national program on factors, such as protein, that have large monetary impact. Ted Hoelik (Hastings) noted problems in uniform application of SRS values between Hastings and Omaha on the same samples (13.11 to 12.9 on HRW).

Mike Eustrom (Omaha F.O.) acknowledged the different baselines but noted that monitor samples were very close and appeals looked very good. Mike noted a number of improvements since the May meeting: daily biasing (when necessary), a better sample exchange program, and more uniform techniques.

Gary Bothwell (Kansas) had no recent complaints although he too had questions about the slope adjustments and priorities in the program. John Giler (Washington D.C., FGIS) primarily was concerned with the mechanics of sample exchange and the protein instruction of which he is the author. Diane Polacek

(Kansas City F.O.) noted that although few service points were involved in her area, the monitors looked good and she saw no change since the May meeting. Bill Brookreson (Washington State) emphasized concerns in intermarket differences out of the Minot/Grand Forks area and the growing number of foreign quality complaints.

A number of participants reserved comments for the general discussion.

The general discussion and individual comments identified six areas of concern:

(1) Intermarket problems - specifically from the Grand Forks/Minot area to the West Coast and Aberdeen to Lincoln that were specified. John Marshall noted another that he was aware of.

(2) The calibration constants - specifically the accuracy of the current calibrations and whether a dual calibration for HRW and HRS was still appropriate.

(3) Lack of follow up and proper priorities from QCTB - real or perceived.

(4) Uniformity in procedures, checktesting, etc.

(5) Need for and uses of an "early warning system."

(6) Foreign quality complaints - specifically from Japan, Korea, Singapore, Malaysia, Thailand and Venezuela.

The intermarket problem seemed to be somewhat elusive. Kevin Rea and Bill Brookreson discussed their recent problems with samples out of the Grand Forks circuit. Bill Hutchings discussed historic differences for many years between values set in Denver and for the West Coast. He noted the impact on his own business - that buyers would only settle on destination protein.

The problem seemed to be to identify problems before they reached crisis proportions. There was extended discussion of the possibilities for an early alert system with Dr. Watson. The conclusion of the discussion was that, although an early alert system could be set up, there is really no way that QCTB can respond to the information generated in a timely manner.

The discussion on how to deal with the specific intermarket differences directed more at ways to narrow the problem. John Marshall suggested a system of sample exchange as a follow up to discussion in the May meeting. This consists of:

(1) Exchange of SRS samples - Olympia will send HRS SRS samples to agencies and the field offices in Omaha and Grand Forks circuits and will receive their SRS samples. The samples will be run as quickly as possible and results sent to the participating agencies, field offices and QCTB.

(2) Samples from 10% of all HRS cars sent from the Grand Forks area to the West Coast will be sent to Olympia. The west coast and origin results will be sent to Kansas City by electronic mail so that the sample can be forwarded if needed.

(3) The exchange will continue for 6 months to identify the source of the differences.

The question of the calibration constants seems to be tied to intermarket differences. This problem is a complicated one involving the question of wheat classing, mixed characteristics, and the validity of a dual vs single calibration. Kevin Rea raised the question of whether the current situation in classing caused by cross-breeding had not in effect also changed the average characteristics to the degree that a single calibration would be more appropriate. Kevin asked in effect the dual calibration did not make HRS protein artificially high. Bill Brookreson asked about the status of the calibration study conducted through the infranet system. Dr. Watson had no firm idea of when the study will be completed. According to Dr. Watson, the data is still to be collected.

According to Watson the first priority is the slope verification study. The HRW slope should be completed by November with all machines aligned and the HRS by January. Watson reported that they had found some significant machine variation between instruments. He felt this correction would impact intermarket differences. The calibration study, when completed, should enable verification of the current calibration constants validity (preliminary indications apparently indicate no problems). The calibration study data should also enable FGIS to compare the validity of a single vs a dual calibration for HRW and HRS. Bill Brookreson raised questions about the progress of the study and the validity of the current settings based on some work done in Portland F.O. and Olympia.

Watson also noted that the grain was available for now for the single set of SRS samples. He hoped to have a single set available for distribution by May 1. When asked about the delay, Watson replied that he was waiting for the complete instruction to be available. Again in response to a question about what needed to be decided he noted that it hadn't been decided whether to grind daily or weekly. He also stated that he had not commented on John Giler's draft preferring to wait until all chapters were complete. This was the object of several unfavorable comments.

The monitoring system was discussed including the number of samples to QCTB and the role of the field office. Watson appeared confused about how values are set in the field in his concern about "stacking" of values. Watson was concerned about getting adequate and timely samples from each office and each operator. Bill Hutchings and Mike Eustrom both questioned the role of the field office in this system. Bill Brookreson felt that the quick response and close working knowledge was critical. The conclusion seemed to support the current system but with better analysis and quicker feedback. The role of QCTB should be to identify problems and quickly respond. Analysis of data is as important as collection.

Intermarket exchange beyond the system suggested by John Marshall was also encouraged - from origin to destination. The data must be fed back to QCTB to identify the problems and act.

The problem of foreign quality complaints was brought in by Bill Brookreson.

Brookreson shared information from U.S. Wheat Japanese traders and the exporters he had received indicating problems since July off the West Coast to Japan, Korea, Singapore, Thailand, and Malaysia. AACIWA members expressed uniform concerns about the potential loss of markets. John Marshall noted some discrepancies between receiving ports by Japan. Members were told that follow up was taking place through international monitoring. The AAGIWA committee was unanimous in urging that action be taken quickly to assure that the protein system was acceptable to both buyers and sellers.

John Giler gave an update on the protein instruction and asked for input in several areas. The self feeding hopper, discussed in May, is to be optional. Data about its value is not clear. SRS moisture tolerance is currently ±.5%. After extended discussion it was agreed to try ±.3%. There was also extended discussion of what samples were to be used for monitoring. Giler had selected GIM's samples in the instruction. After considerable review it was determined that this would be insufficient numbers and that the current system of 5 per class, per week was preferable. Giler's work is not yet complete although he is working on the 2nd draft. Giler also noted that he had not received Watson's comments.

Our thanks to John Marshall for arranging the meeting and to FGIS staff for their input and contributions.

C. ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

December 5, 1986

Mr. John W. Marshall
Director, Field Management Division, USDA/FGIS
1400 Independence Avenue, S.W., Room 1661 South Bldg.
Washington, D.C. 20250

Dear John:

On behalf of all the members of the AAGIWA Protein Committee, I want to express my appreciation for the opportunity to follow up on our continuing protein problems. I apologize for the rather loose manner in which the meeting was conducted. Had I realized that I was to chair the meeting, I would have prepared a much better agenda. Nonetheless, I think a number of valuable results were achieved.

The members of the committee came to the meeting with concerns basically in three areas: intermarket differences, follow up and leadership from QCTB, and foreign quality complaints.

The intermarket problems have a direct and immediate impact on delegated and designated agencies. Lack of consistency in the system erodes everyone's credibility and costs the interior agencies permissive inspections. Two of the areas where differences were specifically identified were out of the Minot/Grand Forks/Minnesota area to the West Coast and from the Aberdeen S.D. area to Lincoln. We consistently find that market samples from this area average 0.5% and more higher than our results or Lincoln's results. This is certainly not a new problem. On November 13, 1985 a unit train out of Halstad, Minnesota to Vancouver showed a difference of 0.5% and the information was sent to QCTB for follow up. Our problems with wheat out of the Minot area began in September, 1985 with those same types of differences and continue to the present shipments into Continental Grain in Tacoma. Lincoln Inspection has a similar long-standing difference with HRS out of the Aberdeen area.

With this history, we find it difficult to understand how QCTB seems to be continually surprised when problems are discussed. In spite of an elaborate national monitoring system with a continuous inflow of samples and appeals, QCTB has yet to demonstrate any ability to develop a proactive program. Somehow the system for monitoring the nation for uniformity does not seem to be working. We generate data for the sake of data rather than to act upon. It is difficult to tell if they have a short attention span or just lack of analysis and follow up on problems.

We have initiated the sample exchange program worked out in Kansas City. We have received samples from the Grand Forks circuit and have run those we received. Our SRS samples have been shipped and received in Grand Forks and Omaha. This SRS data should give us a beginning for analysis. I hope that, should these compare well, we will immediately begin looking for other possible causes of the differences and should they compare poorly – we quickly analyze why. We appreciate your efforts in setting up the exchange and the ongoing system of follow up.

This is very closely related to the second major area of concern – the lack of leadership and follow up from QCTB. It was difficult for us to understand why QCTB did not have any follow up to the inner market problems and why the current sample exchange and accumulation of information originated from this meeting. QCTB seems committed to bureaucracy but not to leadership in the program. There seems to be a failure at QCTB to understand the monetary impact on the industry of these problems (Continental claims to have lost $225,000 on a single ship) and the disruption that these differences cause.

We were also concerned at an apparent lack of understanding of the program as it now functions, specifically the question of "stacking" built into the system. It was apparent that Dr. Watson does not have a clear idea of how values are being set with the QCTB baseline and yet is setting policy on how the system should be structured for monitoring effectiveness. If the sample monitoring system is based on false assumptions, one wonders how meaningful the results are.

I am also concerned that QCTB has not responded to the draft of the protein instruction. That appears to be an easy way to disavow responsibility if something doesn't work as planned. It is my own feeling that the critical remarks addressed to John Giler's work are hardly appropriate from one who hasn't bothered to submit written comments to help him produce a better product. Again it shows me a lack of commitment and follow through to produce a better program.

Some of the commitments made by QCTB seem somewhat questionable. For example, the spring wheat slope verification is to be "completed" by January, yet when I returned from Kansas City we had the request to begin gathering the samples. The request was for 30 samples of ranges 10-17% of the 15 lbs each. This is to be done in 3 weeks in the past harvest period. By Dr. Watson's own reckoning – QCTB must have at least a month lead time to produce verifiable Kjeldahl values. January seems unlikely for completion.

We are also quite concerned about the progress of the calibration study. It was our understanding in the January 14/15 meeting in Washington D.C. that the intranet data to verify the accuracy of the calibration constants would be available by February 14, 1986 (Homer Dunn's memo, January 30, 1986). The completion date is a question mark again. The single set of SRS samples by May 1 also seems dubious when Dr. Watson made it issuance contingent on a final instruction on which he has refused to submit comments and made it so contingent on that issuance for reasons that are not at all clear. There seems little change contemplated in procedure except a decision on daily or weekly grinding. This hardly seems a seven month decision.

The third area of concern is the foreign protein complaints from Japan, Korea, Malaysia, Singapore, Thailand and Venezuela. We are deeply concerned that these have surfaced since our values were raised in July at QCTB's behest. We know that our values are higher than they have been since the program began, we can verify that with previous SRS samples. This makes us, at least, extremely uneasy and erodes the already shakey confidence we have in QCTB. As a group the agencies of AAGIWA are deeply concerned with threats to our stable markets. I understand from U.S. Wheat Associates, that the Venezuelan's have totally withdrawn from the U.S. protein wheat market. Significant loses of the Japanese market and Korean would be a very severe blow to Washington exports. We hope efforts are made to quickly address these concerns and find a resolution that all parties can accept.

Again, we appreciate your continuing efforts in the protein area as evidenced by the Kansas City meeting. With everyone working together, I am still convinced that the system will work as it should.

On behalf of the AAGIWA protein committee,

Sincerely yours,

William E. Brookreson
Grain Inspection Program Supervisor

cc: Gail Jackson
AAGIWA Protein Committee

United States
Department of
Agriculture

Federal Grain
Inspection
Service

USDA-FGIS Technical Center
10383 N. Executive Hills Blvd.
P. O. Box 20285
Kansas City, MO 64195

December 16, 1986

Mr. William E. Brookreson
Grain Inspection Program Supervisor
Department of Agriculture
406 General Administration Bldg., AX-41
Olympia, Washington 98504-0641

Dear Mr. Brookreson:

This is in response to your letter to Mr. Marshall dated December 5, 1986 regarding the FGIS protein program. I received a copy of your letter from Mr. Marshall on December 15, 1986.

I will discuss each of the three items identified in your letter (1) intermarket differences, (2) foreign complaints and (3) QCTB.

1. Intermarket differences. I was not surprised to hear of intermarket differences between the Midwest and the West Coast. As Mr. Hutchings pointed out, this has been going on for 30 years or more. What did surprise me was that you and others were not aware that a sample exchange program was established at the first meeting of the group. Even Mr. Marshall expressed his surprise that this was not understood. It is my understanding that if problems on unit trains were occurring the origin and destination points were to exchange samples and send all data to QCTB. We have received no such data since the first meeting. Therefore, if problems on unit trains were occurring personnel in charge at origin and destination locations did not take appropriate action as instructed.

I hope you do not believe that the exchange of the standard reference samples is the beginning and the end to the sample exchange program. Samples should be exchanged on all unit trains (see Mr. Marshall's memo dated 12/1/86). To date we have not received any information on unit trains implemented under this program.

2. Foreign Complaints. The issue of foreign complaints is handled by Dr. Shuey, Chief, International Monitoring Staff. Therefore, I will not comment on results being obtained. All results are sent to Dr. Shuey for analysis and distribution as instructed. There is a memorandum of understanding between FGIS and the Foreign Agricultural Service (FAS) on this matter per instructions from the Secretary of Agriculture.

   You mentioned that the foreign complaints have occurred since July because we raised your values. QCTB requested that the values of your standard reference samples be raised after repeated Kjeldahl analysis. This was done with full review of the data and concurrence by upper management.

3. QCTB. The sample exchange did not originate from the recent meeting. It was set up by Mr. Marshall at the first meeting. There apparently was a misunderstanding of who was to implement the exchange of samples on unit trains. Logically this should be the point of origin because they are the ones that best know about the source. It is very difficult for QCTB to implement sample exchange on unit trains if we are not informed of the unit trains.

I am surprised and disappointed at your comment regarding Continental Grain losing $225,000 on one ship. Will Continental Grain document their data on this ship as well as on how much money they made on other ship(s) by providing protein below contract. Just because Continental Grain complains about one ship does not mean all FGIS official proteins are wrong. I believe I fully understand the protein program on a national basis and for you to imply that I do not is absurd. The entire national program is not run the same as it is in the State of California and Washington. We do not have a direct monitoring program to all locations. This is what I was trying to point out. In my opinion, until we have this, there continually will be unresolved complaints.

I made it clear at the meeting why I had not submitted my comments on the first chapters of the protein handbook. In my opinion, I should not be requested to submit comments on a piece meal basis, especially when the instructions in the first part of the book will be directly effected by what is finalized in the later chapters. Mr. Giler was well informed of why I had not submitted my comments. Also, to my knowledge, others have not submitted their comments. What failed to come out in the meeting was that I submitted a draft proposal on November 5, 1985. Since then it has been out of the hands of QCTB. I have not been successful in getting the handbook published after repeated inquiries and requests.

If those locations that were requested to furnish samples for the HRS slope study had submitted them by 12/15/86, then the study would have been completed in January if unforeseen higher priority projects do not surface. For your information, we have received several samples from other locations but none from Olympia. Just as QCTB is expected to react and respond, so should others.

If you recall, the month lead time was only for standard reference samples.

The entire InfraNet system is an internal FGIS matter. There was a set of calibration constants developed for the Technicon 400 instruments; however, the constants were never placed into the instruments for verification purposes because of other higher priority projects.

In case you are not aware, we have been operating with only one Kjeldahl unit since March, 1986.

> I have concern regarding the issuance of national check samples before the protein handbook is completed. In my opinion, the handbook should be finalized and agreed to before we proceed with any portion of it. History would indicate that changes will be made before we finalize the system. As you know, there is some disagreement over what type and how many samples should be used.

In summary, I believe your letter adds nothing to solving any problems. You presented no actual data to substantiate your claims and offer no possible solutions. Your letter apparently attempts to create a friction between QCTB and you. I suggest that I am above this. Personal remarks of a derogatory nature as contained in your letter serve no useful purpose and, as a professional I will not respond to these comments. If you truly want to assist in attempting to solve the problems I recommend you work with us and make constructive suggestions and recommendations and not destructive unwarranted criticism.

Sincerely,

C. A. Watson

C. A. WATSON, Branch Chief
Quality Control and Testing Branch

cc: Marshall
Jackson

United States
Department of
Agriculture

Federal Grain
Inspection
Service

USDA-FGIS Technical Center-ST
Quality Control Branch
P. O. Box 20285
Kansas City, MO 64195

April 8, 1987

TO: All Field Offices and Specified Service Points Analyzing HRW and HRS Wheat for Protein

FROM: C. A. Watson, Branch Chief
Quality Control Branch C. A. Watson

SUBJECT: National Reference Samples

Five HRW and five HRS wheat samples are being sent to you under separate cover. These samples are the National Reference Samples (RS) for HRW and HRS wheat. All specified service points shall commence using these samples effective May 4, 1987.

The protein and moisture values shown below were established by the Quality Control Branch. These values shall be used to bias the NIR instruments for HRW and HRS wheat, respectively. The instructions for biasing are found in the Grain Inspection Handbook, Book V, Chapter 3, pp. 3-1 to 33-4 (copy enclosed). Contrary to p. 3-1, para. B.2., the moisture baseline value provided below shall be used.

Sample No.	NIR Protein % (12% mb)		Moisture %
	HRW	HRS	
1	10.92	11.19	9.30
2	12.75	12.99	8.45
3	13.50	13.61	8.84
4	13.85	14.01	9.56
5	15.55	15.59	8.27
6	12.00	12.17	10.56
7	13.37	13.51	10.01
8	14.15	14.24	8.75
9	15.16	15.21	8.85
10	16.24	16.34	9.74
Baseline(Avg.)	13.75	~~13.89~~ 13.69	9.23

cc: Jackson
Marshall

Posted: Tue Apr 14, 1987 10:55 AM EST Msg: DGIH-2413-3246
From: JMARSHALL
To: field.offices
CC: fgis.mgt, aclass, cawatson, dshipman, rpforr, area.chiefs
Subj: Biasing Protein Instruments

SUBJECT: Biasing Protein Instruments

Effective April 15, 1987, at 12:01 a.m., the established base line value fo the Hard Red Spring Standard Reference Sample (SRS) values shall be lowered by 0.2 percent protein and all near-infrared (NIR) instruments rebiased accordingly.

Each field office is responsible for contacting official agencies in their circuit and notifying them of this change.

If you have any questions regarding this change, please call your respectiv area program chief.

Action?

Posted: Thu May 7, 1987 4:21 PM EDT Msg: AGIH-2422-1605
From: CAWATSON
To: SBENNETT, MBLUST, ELBROWN, DWCOVINGTON, FDOUCET, MEUSTROM, JGENIUS,
DGROVE, CHERNDON, WHUELER, LMCDONALD, LNAFZINGER, JPHELPS, TWRENN, GTOMS,
GWASSON, HWESTBROOK, LZEHM, JARUZEK, HDUNCAN
CC: CAWATSON
Subj: HRS NATIONAL REFERENCE SAMPLES

THE BASELINE OF THE HRS WHEAT REFERENCE SAMPLES ISSUED BY THE QUALITY CONTR BRANCH ON APRIL 8, 1987 HAS BEEN CHANGED BY THE MEMO FROM JOHN MARSHALL DATED APRIL 14, 1987. THE NEW VALUES FOR HRS PROTEIN ARE:

SAMPLE NUMBER.	PROTEIN	M115
	HCS	9.73
1	10.99	
2	12.79	
3	13.41	
4	13.81	
5	15.39	
6	11.97	
7	13.31	
8	14.04	
9	15.01	
10	16.14	
AVERAGE	13.69	

THE MOISTURE VALUES REMAIN THE SAME AS THE ORIGINAL BASELINE.

Action?

United States
Department of
Agriculture

Federal Grain
Inspection
Service

STANDARDIZATION DIVISION

July 7, 1987

TO: W. Kirk Miller, Administrator

THRU: David R. Galliart, Deputy Administrator

FROM: Ron Bicsak/N. Gail Jackson Ron B G. D. Jackson
Standardization Division

SUBJECT: West Coast Protein Meeting

The subject meeting was held at the Portland Field Office on June 24, 1987. In attendance were W. Kirk Miller, Lloyd Brown, William Brookreson, Gary Wasson, Walter Rust, Robert Baker, Robert O'Toole, Art Choate, Ron Bicsak, and Gail Jackson.

Considerable time was spent discussing the 0.2 percent bias change which was implemented April 16 for Hard Red Spring (HRS) wheat. Since implementation, other procedural changes as well as national standard reference samples corrected most of the problem. Currently, all NIR's are running on the low side of Kjeldahl results for HRS. To bring the NIR results into closer agreement with Kjeldahl, field locations were contacted and requested to bias instruments up 0.1% if they were below the base line value of 13.69 or if at 13.69 or above to make no change. William Brookreson expressed his opposing view and interpreted the handbook to say that the NIR instrument should always be biased back to the base line every time it is biased, no matter what. Kirk Miller explained that no major adjustments to the base line would be made until the new HRS calibration was placed into effect August 1.

The differences between some of the elevators and Olympia FO results and the differences between Portland Kjeldahl and QC Kjeldahl were also discussed. Gail Jackson illustrated a possible reason for location differences, while these locations were still checking on their SRS samples. Some locations have a slope above 1.0 and others are slightly below 1.0. While the averages for the SRS samples may cross exactly on 13.69, at either end of the range, results may vary considerably.

Grinder temperatures, time delay between grinding and actual analysis, environmental conditions, and operator procedures were discussed with no conclusions drawn. Consensus was QC needed to establish guidelines for these areas.

Dr. Shuey's study was accepted by the group very positively. It was agreed that this type of study is needed more often to try and solve some of the differences between locations and QC. Bob Baker was chosen to run the samples at each location for QC (see attachment).

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United States Department of Agriculture

Kirk Miller said that all shiplots would now be sent to QC for analysis. These sublots from the PNW would be added to the Gulf Coast sublots already being sent to QC.

Kirk Miller suggested that a possible meeting of FGIS, industry, and the academic community be established in the form of an educational seminar. This would enable new technology, new approaches to problems within the system, and a sharing of views on how to improve and maintain the system be exchanged.

Attachment

cc: C. A. Watson
Lloyd Brown
Gary Wasson
✓William Brookreson

QC - Portland - Olympia Check Study

Samples

10 samples of HRW
10 samples of HRS
10 HRW SRS - from QC
10 HRS SRS - from QC
10 ground samples HRW*
10 ground samples HRS*
10 ground HRW SRS*
10 ground HRS SRS*

*All ground samples done by QC.

Directions

1. Regular operator run his SRS samples and adjust bias if necessary.
2. Regular operator run all above samples.
3. QC person (Bob Baker) run same samples on same machine and same bias at each location.
4. If large difference in results - rebias and run again.

Locations

Portland FO (NIR and Kj)
T-4
T-5
Olympia FO
Vancouver
Kalama
QC (NIR on two machines and Kj)

ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

July 27, 1987

To: Inspection Area Managers/Protein Specialists

From: W.E.Brookreson/E.Lloyd Brown E L Brown

Re: Protein Bias

Effective today the attached protein baseline bias figures are effective. Where a cargo is in the process of loading, baseline adjustments are effective upon completion of that lot or cargo.

ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0611 • (206) 753-5063

July 27, 1987

NIR PROTEIN - 12% MOISTURE BASIS

Sample No.	HRW	HRS
1.	10.92	11.09
2.	12.75	12.89
3.	13.50	13.51
4.	13.85	13.91
5.	15.55	15.49
6.	12.00	12.07
7.	13.37	13.41
8.	14.15	14.14
9.	15.16	15.11
10.	16.24	16.24
Baseline	13.75	13.79

C. ALAN PETTIBONE
Director

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
406 General Administration Bldg., AX-41 • Olympia, Washington 98504-0641 • (206) 753-5063

July 24, 1987

Mr. N. Gail Jackson
Director
Standardization Division
USDA/FGIS Technical Center
P.O. Box 20285
Kansas City, MO 64195

Dear Mr. Jackson:

On behalf of the Protein Committee of the American Association of Grain Inspection and Weighing Agencies, I am writing to you to review what we see as the problems and accomplishments in the protein program since the implementation of the new procedures and 12% moisture basis on May 1, 1987.

Until recently, unclear instructions and inconsistent procedures have plagued the program. The publication of Book V, we feel, was a definite step in the proper direction. After years of incomplete and contradictory procedures on NIR protein, we now have the instructions collected, clarified and uniformily accessible. The instruction provides a standardization of methodology that was sorely needed. Many people contributed ideas and information but John Giler, particularly, deserves credit. Unfortunately, the distribution of Book V was not timely in some instances and that started us off slowly. Lincoln Inspection Service, as an example, did not receive a copy through normal channels until May 22, 1987. As that procedure is revised and updated over time, it should help keep the program on track. With the procedure in place, it is very important that it be followed. Thus far, at least, there continues to be inconsistency in that regard at all levels. It is important that these inconsistencies be identified and corrected. We see the point at which a bias adjustment is initiated as one critical example of that inconsistency. Procedural variables will be much more controllable if the instruction is followed.

The second major step forward was creation of a national system for Standard Reference Samples. A set of quality, stable reference sample is a critical element in eliminating intermarket problems.

The current set of SRS samples is one with which there has been widespread concern among the agencies. It is very unfortunate that we have had infested samples and samples visibly contaminated with WOCL and FM. The result is that the very technicians upon which the accuracy of the program depend, begin with a negative attitude toward the commitment to quality at QCI:. That type of damage to the program credibility is most difficult to repair. We have also had concerns expressed, concerns that we share, that some of the samples do not repeat well. We would certainly hope that, in the future, more time and resources may be expended to produce the best possible set of Standard Reference Samples and that, as we have discussed at several meetings, stable values be established and maintained for the life of those reference samples. Not only the State of Washington but several other agencies have expressed willingness to help in the collection process.

The successful completion of the Hard Red Spring calibration study, we feel, is a significant step in that direction of stability also. We are hopeful that this will eliminate some of the current biasing and intermarket differences. We strongly support the commitment that FGIS has made to maintaining current and robust calibrations.

The addition of the autofeeds was also a step forward. It seems to have considerably reduced grinding differences. There are other areas in the grinding procedure that remain troublesome, however. Problems with temperature of the grinder head remain to be resolved and we are pleased that work continues in this area. Our own studies in the Olympia lab indicate to us, for example, that the 15 minute warmup with the rubber stopper is too long, that at least the first three samples are excessively hot and that NIR moistures are artifically low. Our figures indicate that 10 minutes or less achieves operating temperature. We would hope that input from the field of such results under operating conditions be encouraged. Research should quickly establish an optimum time that may in fact vary by grinder. This problem is particularly troublesome since the first samples run are usually the SRS samples. There are other problems with temperature also. The impact of temperature of the whole grain needs to be studied, also. In our experience, cold grain will produce lower results. Colleagues in the State of Montana have indicated that in their experience each 10° makes about a 0.1% difference in protein results. This may become a much more significant problem with the 12% moisture basis when the sample will no longer need to warmup in winter to determine the Motomco moisture before protein is determined. We have also found that if the sample is left in the UDY grinder after the sample has cleared, it will also rapidly impact protein values because of heating and drying. In short, the autofeed is a step in the right direction but is not the solution to all the grinding problems. Again, we would hope that input from the field to QCB be actively encouraged.

We need to do a better job explaining protein to some elements of the trade. At least in the Pacific Northwest where moistures are characteristically low, there is a great deal of confusion about the relationship between "as is", 12% moisture basis and dry matter basis proteins. There is a widespread belief among producers in the low moisture areas that somehow they are being penalized for producing "dry wheat". The conclusion they have drawn is that they can regain lost protein by adding moisture or harvesting grain at higher moistures. We have used every avenue at our disposal to convince these producers that this belief is not only erroneous but also that acting in this way is potentially dangerous and/or illegal. There is another group that has become convinced that the dry matter basis somehow will restore premiums lost in the change in moisture basis. Again, we have put together materials to show that the only change from 12% to dry matter is the size of the numbers - the relationship is linear. There remains, however, a great deal of confusion. It would be very useful and good public relations for FGIS to put together a slide presentation or some other type of material clearly explaining what is being measured, why the change and how the different certifications relate.

In discussions with the committee, strong dissatisfaction with the UDY grinder and with UDY corporation generally was universal. The price of equipment from UDY seems at best inflated and their quality control haphazard. As noted in the warning from QCB, the thickness of the screens was altered without regard to the consequences (slope change). Members have reported other equipment purchased that has been defective. Different generations of grinders and grinding rings seem to produce different results. We feel strongly that, if UDY is to be the "approved" grinder, they must be required to meet tighter precision specifications or that an alternate grinder should be developed and approved. We have enough variables without UDY orporation adding to the problem. The current situation is unacceptable if we are to have a quality program.

Research work, upon which procedures are to be based, needs stronger field testing. As an example, we feel that the question of biasing with powder or fresh grind needs to be revisited. On our tests in the field, we are unable to reproduce the results Don Koeltzow achieved on sample aging. Enclosed are the results of a test run in Olympia using 5 samples comparing a daily fresh grind with the rerun of the powder. As you will see the powder - rather than going down, tended to rise slightly in value. A similar test was run in Lincoln with similar results. I would urge that we determine why we have an apparent opposite result. We have to be certain that we are comparing like procedures and that changes will produce the results intended.

The final area where we continue to have serious concerns is with timeliness of information. In instances where rapid reply to questions could prevent thousand of dollars inappropriately changing hands, we are still seeing answers in weeks rather than in one or two days. This has been a problem in air-oven moistures but particularly in protein monitoring. There are several examples that readily come to mind. The instrument in Omaha Field Office was down for some time and no rapid adjustment was made to compensate for that. We realize that QCB has problems with staffing that should be resolved or at least alleviated in the near future but the fact remains that differences between Omaha and Hastings, as an example, were not addressed in a timely manner and, as of today's date, still have not been adequately addressed. Air-oven moistures are slow in being completed. We need to do a better job and then may well require more staff. Information was provided to QCB from the field about slope problems caused by the change in the grinder screens but thatwas not disseminated for weeks. Results or information that are weeks old from a field office or QCB might be interesting but are of little value in maintaining the quality of the program. We also need timely feedback on export shipments to detect problems early and keep us from reacting to a crisis. Another key to this whole process will be staffing stability at QCB. We have seen far more turnover than is desirable. Adequate numbers will not solve the problems if they are always learning the program. Some things are positive here also. I found Ron Bicsak to be an intelligent and thoughtful addition to the QCB staff. His experience in the trade should also provide a valuable insight into the needs of the program.

The direction we are going, even with the problems noted above is the right one, however. We need to take care to stay on track. We are doing a much better job of identifying problem areas than we have done in the past but that could improve. The Book V provides a good corner stone for uniform procedures. As with everyone else working in the NIR protein area, I experience times of intense frustration that we are not achieving answers more rapidly. At least now these times are alleviated by periods when we do feel that we are on the right track at last. I think these feelings of alternating frustration and hope are shared by everyone on the committee, and we suspect, in FGIS.

In 1987-88, we hope to continue to work with you, with QCB and with Field Management to identify and try to resolve problems - not just to complain. Our goals are the same, the best quality program we can produce. That is a commitment to active support, not passive observation. In summary, we view the primary accomplishments as:

- implementation of Book V
- the national reference samples
- the calibration study's completion

We see major emphasis needed from FGIS in:

- identifying and addressing remaining procedural inconsistencies.
- better information to the trade on protein.
- better coordination of research and field information.
- adequate, stable staffing at QCB.
- timeliness of response to questions and problems.

Finally we see the need for close cooperation between FGIS and official agencies:

- obtaining the best reference samples possible.
- identifying problems and seeking solutions.
- studying the impact of temperature not only of the grinder but also of the sample.

The level of communication we achieved this past year has been very helpful, our goal this year is to better that level.

Sincerely yours,

William E. Brookreson
Grain Inspection Program Manager
Washington State Department of Agriculture
Chairman, AAGIWA Protein Committee

attachments

cc: W. Kirk Miller
Cliff Watson
John Marshall
David R. Shipman
Kevin Rea
Ted Hoelch
Bill Hutchings
Pat Corrigan

TIME TESTS

OF

TEN SAMPLES

(WEEK OF MAY 18-23, 1987)

	MON	TUE	WED	THUR	FRI
FIRST	11.07	11.08	11.06	11.09	11.08
LAST	11.05	11.09	11.07	11.08	11.07
HIGH	11.10	11.11	11.09	11.11	11.10
LOW	11.05	11.06	11.05	11.06	11.05

	JULY 6 FLOUR	JULY 6 FLOUR	JULY 6 FG*	JULY 7 FLOUR	JULY 7 FG	JULY 8 FLOUR	JULY 8 FG	JULY 8 FLOUR	JULY 8 FG	JULY 9 FLOUR	JULY 9 FG	JULY 9 FLOUR	JULY 9 FG	JULY 10 FLOUR	JULY 10 FG	JULY 10 FLOUR	JULY 1 FG
#1	9.03 18.03 17.44	9.05 17.83 17.25	8.93 17.8 17.2	9.14 17.76 17.2	8.65 17.95 17.29	9.17 17.85 17.29	9.15 17.89 17.33	9.23 17.92 17.37	8.55 17.87 17.2	9.22 17.74 17.2	8.91 17.96 17.35	9.29 17.82 17.29	8.65 17.89 17.23	9.29 17.86 17.33	8.58 17.77 17.11	9.35 17.85 17.33	9.0 1 17.4
#2	10.31 13.38 13.13	10.28 13.2 12.95	10.09 13.55 13.26	10.29 13.47 13.21	9.91 13.54 13.23	10.28 13.61 13.35	10.33 13.39 13.14	10.32 13.4 13.15	10 13.46 13.16	10.29 13.25 13	10.05 13.51 13.22	10.32 13.42 13.17	9.98 13.5 13.2	10.32 13.4 13.15	9.95 13.58 13.24	10.34 13.41 13.16	10.3 13.5 13.
#3	9.31 14.48 14.05	9.31 14.44 14.01	9.25 14.12 13.69	9.41 14.54 14.12	9.15 14.29 13.84	9.43 14.43 14.02	9.27 14.21 13.78	9.45 14.55 14.14	9.08 14.18 13.72	9.48 14.23 13.83	9.11 14.37 13.91	9.51 14.4 14	9.15 14.22 13.77	9.49 14.56 14.16	9.11 14.44 13.98	9.56 14.49 14.1	9.3 14.4 1
#4	9.32 15.08 14.63	9.33 14.79 14.35	9.27 14.99 14.54	9.41 14.96 14.53	9.22 14.97 14.51	9.42 14.99 14.56	9.33 14.86 14.42	9.46 14.97 14.55	9.08 14.67 14.2	9.5 14.83 14.42	9.21 15.02 14.56	9.49 15.06 14.64	9.17 14.91 14.45	9.5 14.97 14.56	9.18 14.69 14.23	9.57 14.92 14.52	9.3 14.7 14.3
#5	10.01 14.99 14.66	10.01 14.77 14.44	10 14.81 14.48	10.05 14.91 14.59	9.89 15.08 14.73	10.07 14.78 14.46	9.92 15.23 14.88	10.09 14.81 14.5	9.77 14.85 14.48	10.06 14.94 14.62	9.92 14.44 14.11	10.1 14.79 14.48	9.92 14.8 14.46	10.1 14.72 14.41	9.89 15.01 14.66	10.13 14.78 14.47	9.9 14.6 14.3
AGE	9.6 15.19 14.78	9.6 15.01 14.6	9.51 15.05 14.63	9.66 15.13 14.72	9.36 15.16 14.72	9.67 15.13 14.74	9.6 15.12 14.71	9.71 15.13 14.74	9.3 15.01 14.59	9.71 15 14.61	9.44 15.06 14.63	9.74 15.1 14.72	9.37 15.06 14.62	9.74 15.1 14.72	9.34 15.09 14.64	9.79 15.09 14.72	9.5 15.(14.6
CELL	10.24 11:24	10.23 16:25	10.23 16:30	10.23 15:47	15:52	10.24 11:15	11:28	10.22 16:00	16:06	10.06 11:19	11:27	10.23 16:05	10.23 16:13	10.26 11:47	10.26 11:52	10.22 16:02	10.2 16:1

* FRESH GRIND

THE GRAIN IMPORTERS ASSOCIATION
(YUNYU SHOKURYO KYOGIKAI)

Phone: 274-0171/6
Cable: NYUSHOKU TOKYO

1-16, 2-CHOME, NIHONBASHI
CHUO-KU, TOKYO 103
JAPAN

October 30, 1986

Mr. David Galliart
Acting Administrator
Federal Grain Inspection Service
U.S. Department of Agriculture
1400 Independence Avenue S.W.
Washington, D.C. 20250,
U.S.A.

Gentlemen:

We wish to advise you that we are now faced with serious protein shortages of U.S. hard red spring wheat loaded from U.S. Pacific Northwest ports. It is evident from the tables attached hereto that the protein figures inspected by The Japanese Food Agency at the discharging ports in Japan have been increasingly lower than those inspected by the FGIS at the loading ports since July 1986, basis vessels' arrival in Japan, and this tendency worsens.

We have had eleven vessels of U.S. hard red spring wheat, protein 14.0 percent minimum, discharged in Japan within the last three months, and as of today, nine vessels could not clear more than 14.0 percent protein at the discharging port inspection, and in the worst instances, two vessels out of these nine shipments have had protein levels which inspected at less than 13.5 percent.

In the first case, The M/V "KEE INVESTMENT", which loaded at Vancouver, Washington, and discharged in Tokyo, had a protein result of 13.4 percent. The second case was The M/V "OCTA", which loaded at Kalama, Washington, and discharged in Otaru, with a protein content inspected at 13.23 percent. Consequently, a huge claim amount has been filed by The Food Agency against these two shipments for their unacceptable shortages of protein.

The Food Agency has continued to analyze protein by their usual Kjeldahl method, and currently could not find any comparable problems of protein content among the other classes of wheat with the exception of U.S. spring wheat.

The fact of this sudden sharp deficiency of protein content of U.S. spring wheat at the discharging ports has led us to consider that there might be a serious discrepancy existing in the measurement of protein content of U.S. spring wheat between the loading and discharging inspections.

- to be continued -

THE GRAIN IMPORTERS ASSOCIATION
(YUNYU SHOKURYO KYOGIKAI)

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JAPAN

.... 2

You are kindly requested to fully re-examine all the processes regarding this matter, and we look forward to the results of your investigation and to your opinions for a possible manner of solution to this serious problem.

Your prompt and considerate attention to this most important business concern will be highly appreciated.

Sincerely yours,

The Grain Importers Association

Takashi Sado

T. Sado,
as Chairman of
Subcommittee for Contract

c.c. Mr. G. Wasson, Field Office Manager, F.G.I.S. Portland

Mr. A. Class, Chairman of The Board of Appeals and Review, F.G.I.S. Kansas City

Mr. W. Wilson, President, U.S. Wheat Associates, Washington D.C.

Mr. J. Oades, Director, U.S. Wheat Associates, Portland

Mr. R. Bratland, Regional Vice President, U.S. Wheat Associates, Tokyo

Mr. J. Mauritz, President, Pacific Northwest Grain Exporters Association, Portland

Mr. L. Brown, Federal/State Manager, F.G.I.S. Olympia

Mr. T. Sigeta, Director, The Food Agency, Import Division

Enclosure : The Tables of the protein figures
inspected by The Japanese Food Agency

*:REMARK : (10)PROTEIN FIGURE BY EACH VESSEL AT DISCHARGING PORT:
THIS FIGURE IS THE WEIGHTED AVERAGE OF PROTEIN CONTENT OF EACH CERTIFICATE(S) (ON THE BASIS OF EACH INSPECTION LOT) ISSUED BY THE FOOD AGENCY.

(1) NO.	(2) VESSEL	(3) B/L DATE	(4) LOADING PORT(S)(BERTH)	(5) B/L QUANTITY	(6) PROTEIN FIGURE AT L.P.	(7) AVERAGE PROTEIN FIGURE AT L.P.	(8) DISCHARGING PORT(S)	(9) LANDED WEIGHT	(10)*: PROTEIN FIGURE AT D.P.	(10)-(6) DIFFERENCE BTWN L.P. AND D.P.	(11) REMARK
1	KEY GLORY	3/29 3/31	VCR, WA (UGC, VAN)	5,151.046 4,753.958 9,905.004	14.2 14.1	14.15	KOBE HAKATA (ISHIKAWA)	9,857	14.0	▲ 0.15	
2	OREGON RAINBOW II	3/23	VCR, WA (UGC, VAN)	8,449.350 7,350.000 15,799.350	14.2 14.2	14.2	CHIBA TOKYO	15,689	14.0	▲ 0.2	
3	GEORGIA RAINBOW	4/2 4/7	PTD, OR (B.P.E)	10,160.573 9,838.777 19,999.350	14.1 14.0	14.05	YOKOHAMA HIMEJI	19,872	13.97	▲ 0.08	
4	SEIAN	4/8	VCR, WA (UGC, VAN)	11,920.008	14.1	14.1	OTARU HAKODATE	11,870	14.0	▲ 0.1	
5	MAAN	4/28	VCR, WA (UGC, VAN)	15,540.000	14.1	14.1	SAKAIDE (MATSUYAMA) CHIBA	18,652	14.0	▲ 0.1	
6	TOKEI MARU	5/2	PTD, OR (T-4)	15,799.347	14.0	14.0	YOKOHAMA	15,766	14.0	0	
7	WASHINGTON RAINBOW II	4/25	VCR, WA (UGC, VAN)	15,120.000 4,879.350 19,999.350	14.0 14.0	14.0	NAGOYA TOKYO	19,887	14.0	0	
8	EASTERN ROYAL	5/4	VCR, WA (UGC, VAN)	17,300.014	14.1	14.1	HAKATA SHIMIZU	17,240	14.0	▲ 0.1	
9	GREEN CEDAR	5/13	VCR, WA (UGC, VAN)	17,359.582	14.0	14.0	KOBE YOKKAICHI	19,892	14.0	0	

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10	WHITE CORAL	6/6	VCR, WA (UGC, VAN)	19,999.350	14.1	14.1	NAGOYA TOKYO	19,875	14.0	▲ 0.1	
11	SHIBON	6/10 6/14	PTD, OR (L.D.C)	5,084.360 14,556.393 19,640.753	14.1 14.0	14.03	OSAKA HAKATA	19,498	13.86	▲ 0.17	
12	GEORGIA RAINBOW	5/29	VCR, WA (UGC, VAN)	13,650.000	14.0	14.0	CHIBA	13,658	14.0	0	
13	ANANGEL PEACE	5/3 6/18	PTD, OR (T-5) PTD, OR (L.D.C)	9,999.350 10,000.000 19,999.350	14.0 14.0	14.0	YOKOHAMA SHIMONOSEKI (KANMON)	19,871	14.0	0	
14	ORIENTAL ANGEL	6/12	VCR, WA (UGC, VAN)	19,999.350	14.0	14.0	YOKOHAMA KOBE	19,087	14.0	0	
15	OREGON RAINBOW II	7/2	PTD, OR (L.D.C)	19,999.338	14.4	14.4	CHIBA MIZUSHIMA	19,975	14.13	▲ 0.27	
16	TOKEI MARU	6/25	PTD, OR (L.D.C)	17,324.998	14.2	14.2	TOKYO YOKOHAMA NAGOYA	17,238	13.88	▲ 0.32	
17	OCEAN BREEZE	8/7	VCR, WA (UGC, VAN)	19,999.350	14.0	14.0	KOBE YOKOHAMA TOKYO	19,822	13.97	▲ 0.03	
18	MILKY WAY	7/31 8/4	PTD, OR (L.P.C) PTD, OR (T-4)	5,251.315 10,498.685 15,750.000	14.1 14.0	14.00	OTARU HAKODATE	15,673	13.69	▲ 0.31	

※REMARK : (10) PROTEIN FIGURE BY EACH VESSEL AT DISCHARGING PORT:

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(1) NO.	(2) VESSEL	(3) B/L DATE	(4) LOADING PORT(S)(BERTH)	(5) B/L QUANTITY	(6) PROTEIN FIGURE AT L.P.	(7) AVERAGE PROTEIN FIGURE AT L.P.	(8) DISCHARGING PORT(S)	(9) LANDED WEIGHT	(10)* PROTEIN FIGURE AT D.P.	(10)-(6) DIFFERENCE BTWN L.P. AND D.P.	(11) REMARK
19	SANTA CATALINA MARU	7/29	KALAMA, WA (N.P.G.G.)	13,384.350	14.0	14.0	KOBE HAKATA (ISHIKAWA)	13,332	14.0	0	
20	WASHINGTON RAINBOW II	8/16	PTD, OR (T-4)	11,025.000	14.0	14.0	SAKAIDE CHIBA	15,140	13.60	▲ 0.40	
21	GARNET STAR	8/29	VCR, WA (UGC, VAN)	19,999.350	14.0	14.0	CHIBA NAGOYA	19,868	13.58	▲ 0.42	
22	KEE INVESTMENT	9/8	VCR, WA (UGC, VAN)	23,999.850	14.1	14.1	YOKOHAMA TOKYO YOKKAICHI	14,926	13.60	▲ 0.50	2,280MT 13.40 %
23	OCEAN HAWK	8/31	VCR, WA (UGC, VAN)	17,062.000	14.0	14.0	OSAKA SHIMIZU	16,968	14.0	0	
24	JOVIAN LUZON	9/3	PTD, OR (T-4)	14,804.999	14.0	14.0	HIMEJI YOKOHAMA	14,711	13.76	▲ 0.24	
25	PACIFIC VICTORY	9/12	VCR, WA (UGC, VAN)	15,799.350	14.0	14.0	HAKATA	6,353	13.59	▲ 0.41	
26	OCTA	9/6	KALAMA, WA (N.P.G.G.)	15,120.000	14.0	14.0	OTARU HAKODATE	15,055	13.35	▲ 0.65	10,006MT 13.23 %
27	NEW HAIL	9/15	VCR, WA (UGC, VAN)	19,999.350	14.0	14.0	MIZUSHIMA YOKOHAMA	19,911	13.59	▲ 0.41	

Senator **Melcher**. Mr. Brookreson, in May 1985, you were concerned with the accuracy of protein computation.

Mr. **Brookreson**. We were concerned with the kind of results we were getting with Kjeldahl runs from the Quality Control Board.

Senator **Melcher**. Concerned with what?

Mr. **Brookreson**. The national program is set up around a standard Kjeldahl instrument in Kansas City. Beginning in May, we began to get what we considered quite erratic answers on the same samples being resubmitted to Kansas City. It seemed to clear up a little bit after May; but beginning with our new set of reference samples, it got quite extreme.

Mr. **Marlenee**. Point of order. Would Mr. Brookreson move the mike a little closer.

Mr. **Brookreson**. Excuse me.

Mr. **Marlenee**. We are both gray-haired here, and I would like to be able to hear the important words of your testimony.

Senator **Melcher**. Doesn't that mean you are concerned with the accuracy?

Mr. **Brookreson**. Yes, sir.

Senator **Melcher**. And then throughout 1985, in trying to alleviate this concern, there were discussions that transpired. But on December 3, 1985—that is 7 or 8 months later—you state that you reluctantly biased the instrument to 15.12.

Mr. **Brookreson**. The initial run we got on our standard reference samples, when they were submitted, was 14.97. When we ran those samples on our instrument after we had biased the instrument using our 1984 reference samples that we had Kjeldahl values on from Kansas City, it indicated that at 14.97 there would have been no bias adjustment required. We sent those same samples to the Portland FGIS field office, and they ran them on their Kjeldahl and got a 14.94 average for the 10 samples. So we felt at the time we got that average, that it was a good solid figure and it would be a very smooth transition. There would be no biasing between sets of reference samples.

When we did move up to 15.12, that required us to bias the instrument up, and we were concerned that we couldn't see a solid reason why that had been done. We don't know what figure was accurate. The only thing we can say, based on the material we have, is that the figures are different. I guess our concern is, and remained throughout this period, to get an answer of why we seemed to be inconsistent, and if we are accurate at some particular point, knowing exactly why you were accurate and keeping it at the accurate point.

Senator **Melcher**. In other words, you weren't sure that even if you made the adjustments, you were going to correct an inaccuracy?

Mr. **Brookreson**. No, sir. We don't have any way to determine exactly what protein ought to be. The only thing we can do is try to be consistent.

Senator **Melcher**. Then your concerns that began in May 1985 were that the results found at different points varied so much; is that correct?

Mr. **Brookreson**. Yes, sir. As we submitted the same samples back to Kansas City, we got answers that varied in amounts that, to us, were totally unacceptable. I think there are a number of figures in there that demonstrate that. These are the same standard reference samples.

Senator **Melcher**. Earlier, there was testimony to the effect that there was probably a coverup of some error that had occurred. Is this what we are talking about, some error that occurred in 1985 or prior to 1985?

Mr. **Brookreson**. A coverup of that, sir? I don't think there is any coverup there at all. I think there was a great deal of discussion of differences.

Senator **Melcher**. And no coverup of that?

Mr. **Brookreson**. No. I think there was a great deal of work done throughout 1986 to try to get to exactly why there were differences. There were a number of meetings held, and they were widely attended. They are very public information. As far as I know, we were trying to find out why there were differences, and resolve those differences within the system. So I don't see any coverup in that at all.

Senator **Melcher**. Well, after the May 20, 1986, protein meeting held in Kansas City that you testified about, were you more confident after that meeting that something was about to take place that was going to remove your reluctancy to follow directions that you were given in December 1985?

Mr. **Brookreson**. May meeting? As I recall the May meeting, most of what we talked about there were procedural problems, and we hoped that resolving those procedural differences between areas would produce a much more stable system.

Part of the problem had arisen because we were getting very different answers, specifically, from us, for the Minot, North Dakota, area on wheat shipped out to the State of Washington. We were significantly different in our results from what Minot was getting. Our concern was to try and get to the bottom of why we were different, if we were both set using reference samples.

Senator **Melcher**. Do you think that up until this point the reference samples were leading to the inaccuracy? You know, you stated you got a figure of 14.97 in December; prior to December you submitted the same samples to Portland, and they got 14——

Mr. **Brookreson**. 14.94.

Senator **Melcher** [continuing]. 14.94; 0.03 difference. That is pretty close. But then December 3, you were told to bias the instruments to 15.12, which is significantly different.

Now, why was that? In your own mind did you think the differences was due to their having different samples; their reading these samples wrong; their instruments being different, or what?

Mr. **Brookreson**. In our minds, speaking for the people in our program, it appeared to us that they were getting higher Kjeldahl values, and we didn't know why. I am not a chemist by background at all, so I don't know why the numbers were different. But it appeared to us that they were different. They were higher numbers than they had gotten before on the same samples.

Senator **Melcher**. Well, then, the purpose of the May protein meeting in 1986 in Kansas City was just procedural.

Mr. **Brookreson**. To try to find procedural problems that might account for the sort of differences we were seeing. We talked about when instruments were biased and a number of other issues.

Senator **Melcher**. All right. Well, as a result of that, or at least subsequent to that, in July, the bias baseline was raised for Spring and Winter wheat.

Mr. **Brookreson**. Yes, sir. There didn't result in any stability at Kansas City out of that meeting in May, that I can see. In July we were still getting rather erratic answers and, at the point, we biased up—that was after dealing with Mr. Jackson—Gail Jackson who is the head of Standardization Division, FGIS. We looked for a way to find as stable a place in the system as we could. Again, we did not know exactly where the right answer was. We wanted to be consistent throughout the system, and it appeared that doing that would give us the most consistent results with the national program.

Senator **Melcher**. I believe this was a protein committee meeting in Kansas City, 1986. That is a year ago.

Mr. **Brookreson**. Yes.

Senator **Melcher**. At that time did you think the problem had been resolved?

Mr. **Brookreson**. No.

Senator **Melcher**. No. It still had not been resolved?

Mr. **Brookreson**. We still had serious intermarket differences, and at that time we had some very significant foreign quality complaints that concerned us.

Senator **Melcher**. So then the procedures that followed in the spring of this year, you thought were taken correctly to adjust the problem?

Mr. **Brookreson**. The April 15 drop of 0.2? We think they were correct, yes, based on what we knew of foreign quality complaints and where we had been on values, that seemed like it was necessary. From all our information, it appeared to be appropriate.

Senator **Melcher**. All right. That was April, and then there was another drop, was there not, of 0.2?

Mr. **Brookreson**. When we switched to the new reference samples, that bias was reset at 13.69. From our initial run, it appeared that those reference samples would have dropped the bias by about one-tenth. The 0.1 percent change that I discussed is evident looking at the figures now. I did not personally analyze the figures at this point to this degree. We felt there was a slight drop. In preparing for this we analyzed the figures closely.

Senator **Melcher**. About one-tenth?

Mr. **Brookreson**. Yes. Those figures had been called in to Kansas City and had been discussed with Dr. Watson by Arthur Choate, who is our protein coordinator; and I understand similar figures had been called in for the State of Montana, which would have shown about the same thing.

Senator **Melcher**. Then, when was it—in June——

Mr. **Brookreson**. June 15.

Senator **Melcher**. June 15, the baseline was raised?

Mr. **Brookreson**. No, sir. We were instructed to operate at 0.1 above the baseline. When I asked specifically if that was a raise in the baseline, I was told no.

Senator MELCHER. Does it have the same effect?

Mr. BROOKRESON. Yes, sir. That is what I argued, that it was, indeed the same effect.

Senator MELCHER. So the instruction was given to you how?

Mr. BROOKRESON. It came from Mr. Ron Bicsak, who I believe is the head chemist at the quality control branch in Kansas City, by telephone to Mr. Lloyd Brown, who is our Federal manager at Olympia. And at that time, Mr. Brown asked for written confirmation and, as I said, he was told that someone would get back to us. And we were later told that there would be no written confirmation forthcoming.

Senator MELCHER. Had you had this type of experience prior to this, where a written confirmation was not going to be supplied?

Mr. BROOKRESON. Not that I can recall in my time as Program Manager. It had been characteristic, before we took over the program, to get bias changes where no confirmation was given or even asked for. But I don't recall another instance where we didn't get written confirmation; no, sir.

Mr. MARLENEE. Following the line of questioning, April, 0.2 of 1 percent; May, 0.2 of 1 percent; June 15, a raise; request for confirmation; not forthcoming. Now, as a followup to that, a meeting took place in Portland on June 24?

Mr. BROOKRESON. Yes, sir.

Mr. MARLENEE. Who was at that meeting?

Mr. BROOKRESON. Kirk Miller, Gail Jackson from Standardization, Ron Bicsak, Lloyd Brown, myself, Arthur Choate, my protein coordinator; Gary Wasson, Walter Rust, Bob Baker of the FGIS field office in Portland.

Mr. MARLENEE. When did you meet with Kirk Miller, the head of FGIS?

Mr. BROOKRESON. On this?

Mr. MARLENEE. In the State of Washington?

Mr. BROOKRESON. It was in Portland, at the Portland field office. And it was June 24, 1987. The FGIS notes of that meeting are attached.[1]

Mr. MARLENEE. The Administrator was at that meeting?

Mr. BROOKRESON. Yes, sir.

Mr. MARLENEE. At that time, and I wish you to recall this very carefully, did he instruct you to raise the bias by 0.1 of 1 percent?

Mr. BROOKRESON. No, sir. I specifically asked for those instructions, and he did not give those instructions.

Mr. MARLENEE. Mr. Miller did not give you those instructions?

Mr. BROOKRESON. No, sir.

Mr. MARLENEE. Who did?

Mr. BROOKRESON. Nobody did at that meeting.

Mr. MARLENEE. At what meeting?

Mr. BROOKRESON. The Portland meeting on June 24.

Mr. MARLENEE. At what meeting were they given to you?

Mr. BROOKRESON. The instructions we received were oral from Ron Bicsak by telephone to operate at 0.1 above the baseline. No instructions to raise the baseline were given. I asked specifically if we were to raise the baseline figure, and I was not given those instructions. I was told that was not a raise in the baseline; that our office, and a number of other offices, would be operating at above the baseline, but I was not given instructions to raise the baseline figure.

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[1] Mr. Brookreson was referring to a letter from Ron Bicsak to W. Kirk Miller, dated July 7, 1987. See p. 173.

I understand that is not consistent with instructions that were given to other people, but that is the instructions that were given to us.

Mr. **Marlenee**. When did you raise it?

Mr. **Brookreson**. On July 25, I believe.

Mr. **Marlenee**. July 29.

Mr. **Brookreson**. July 29—excuse me.

We did that, and it was my decision to do that when it was very apparent that, in effect, the baseline had been raised in Kansas City and in other offices that we dealt with, and we didn't feel, in all conscience, we could continue to operate at the figure we were at.

Mr. **Marlenee**. So you just did it on your own?

Mr. **Brookreson**. Essentially, sir.

Mr. **Marlenee**. Is that normal procedure?

Mr. **Brookreson**. It probably isn't.

Mr. **Marlenee**. Can any lab out there just go out and raise that—recalibrate the machines on their own?

Mr. **Brookreson**. No, sir. I didn't want to give my people oral instructions. I didn't know of any other way to do it but to give them a written instruction if we were to line up with the national program. It was something I did reluctantly.

Senator **Melcher**. You were given those instructions on June 15, though, were you not?

Mr. **Brookreson**. We were told to operate one-tenth above the baseline at that time, sir; yes.

Senator **Melcher**. Ordinarily, on June 16, you would have done it, would you not?

Mr. **Brookreson**. I guess my problem was, I felt those instructions violated written instructions. And not having written instructions to the contrary, we stayed with what the written instructions said.

Senator **Melcher**. So you waited for the written instructions, which you didn't receive?

Mr. **Brookreson**. Yes, sir.

Senator **Melcher**. And you knew you were not going to receive them; is that correct?

Mr. **Brookreson**. We were informed that they wouldn't be forthcoming.

Senator **Melcher**. You were informed by whom?

Mr. **Brookreson**. By Mr. Miller in Portland that there would be no written instructions to raise the baseline.

Senator **Melcher**. Well, June 15 to June 24, each day goes by; when were you first aware that there weren't going to be any written instructions?

Mr. **Brookreson**. It was sometime after the first call to Mr. Bicsak. That is what prompted the conference call on June 19.

Senator **Melcher**. June 19, at least, you knew?

Mr. **Brookreson**. Yes, sir.

Senator Melcher. Then on June 24, what was the question you asked Mr. Miller?

Mr. Brookreson. I asked very specifically if there was an one-tenth change in the baseline figure.

Senator Melcher. What did he say?

Mr. Brookreson. He said there would be no change in the baseline.

Senator Melcher. Did he say that you were supposed to be operating at 0.1 percent higher?

Mr. Brookreson. He advised us at that time—I believe that was Mr. Jackson's words—to operate at one-tenth above the baseline.

Senator Melcher. Whose words?

Mr. Brookreson. Gail Jackson's. He is the head of standardization. But there was no instruction to that effect, sir.

Mr. Marlenee. On what date?

Mr. Brookreson. June 24.

Senator Melcher. June 24. This was at the meeting, was it?

Mr. Brookreson. Yes. I believe that is pretty much reflected in the minutes of that meeting that Mr. Bicsak and Mr. Jackson wrote, dated July 7.

Mr. Marlenee. May I pursue while you are looking for the minutes?

Senator Melcher. Yes, please.

Mr. Marlenee. I thank the Senator for yielding.

Sir, I am a bit confused. You said you did not receive instructions and, yet, you say you received a suggestion from FGIS. Now, did you receive an instruction to raise by 0.1 of a percent?

Mr. Brookreson. Let me go back to the beginning. In the original phone call, we were told to operate one-tenth above the baseline of 13.69. That, I interpreted at the time as an instruction to do so.

Mr. Marlenee. By phone call?

Mr. Brookreson. By phone call.

Mr. Marlenee. And you requested written confirmation?

Mr. Brookreson. Mr. Brown requested written confirmation at that time.

Mr. Marlenee. And none of the confirmation was forthcoming?

Mr. Brookreson. No, sir.

Mr. Marlenee. No confirmation was forthcoming, and it was at that point that you made the decision not to raise it until—you did not make that decision until August 1 or July 29?

Mr. Brookreson. Yes, sir, that is correct.

Mr. Marlenee. You are prepared to accept the responsibility for a lower protein premium being paid to producers across my State and other States?

Mr. Brookreson. I am not sure what was left out. The accurate relation. It was a hard decision. We felt that we were following the instructions we had received in Portland on the telephone, we were told to operate at 0.1 above the baseline. We didn't have that confirmed in Porland. We didn't feel that we had a clear change in the baseline and we didn't know any way we could act as if we did.

Mr. Marlenee. At any time, did anyone with FGIS suggest to you that the May 4 reduction was—may have been made in error?

Mr. Brookreson. It was suggested, and I don't recall when I first heard it.

Mr. Marlenee. It was suggested.

Mr. Brookreson. It was suggested that with the new samples that there was an overcompensation on May 4, yes, and that this was to take it back to the Kjeldahl.

Mr. Marlenee. Mr. Brookreson, do you recall having any conversation with Mr. Al Williams in which you indicated to him that FGIS had said the May 4 order was erroneous, or that you personally felt the adjustment was totally or partially incorrect?

Mr. Brookreson. Yes, sir. I talked to Al, and conveyed the same feeling; that I was told that it was an overcompensation.

Mr. Marlenee. That was when?

Mr. Brookreson. I don't recall the date, sir.

Mr. Marlenee. Who was it with?

Mr. Brookreson. Excuse me. I guess I didn't follow the question.

Mr. Marlenee. I said did you have any conversation with Al Williams, and was that who it was with?

Mr. Brookreson. Yes, sir.

Mr. Marlenee. Thank you, Senator.

Who in FGIS told you it was an overcompensation, or suggested it may have been? Now remember, you are prepared to accept the responsibility.

Mr. Brookreson. I do not know for certain that Mr. Bicsak used these terms, he spoke to Mr. Brown. I got that from a conversation with Dr. Watson later and from Mr. Miller. Again we were told that this was not to be a baseline change that would require a bias adjustment. For the record the responsibility for that is FGIS's. We are responsible for conveying information to our people.

Mr. Marlenee. Thank you, Mr. Brookreson.

Mr. Brookreson. It was implied in the other conversations.

Senator **Melcher.** In returning to the June 24 meeting in Portland, did you state to Mr. Miller that you had not implemented the 0.1 percent change that you had been directed to take June 15?

Mr. Brookreson. Yes, sir.

Senator **Melcher.** What was his reaction?

Mr. Brookreson. At that point, that is when I asked him for specific instructions, and he said there was no baseline bias change.

Senator **Melcher.** Now, specifically to bias the instruments up 0.1 percent, what did he say to that? You were given an order, weren't you? Usually, you always follow those directions, do you now?

Mr. Brookreson. Yes, sir, we try to.

Senator **Melcher.** So you told him that you had not followed that direction.

Mr. Brookreson. Yes, sir.

Senator **Melcher.** And what was his reaction?

Mr. Brookreson. To be very honest, I don't recall the specific reaction.

Senator **Melcher.** All right. These minutes which you referred to of this meeting, and which you have submitted for the record, are dated July 7, and they are a summary of the discussion—a very brief summary, I take it.

Mr. Brookreson. Yes, sir.

Senator MELCHER. It says that you expressed your opposing view and interpreted the handbook to say that NIR instruments should always be biased back to the baseline every time it is biased, no matter what. Kirk Miller explained that no major adjustment to the baseline would be made until the new HRS calibration was placed into effect August 1.

Was that done?

Mr. BROOKRESON. The new calibrations? No. They haven't been released, as yet.

Senator MELCHER. Was it just procedural circumstances that you decided, sometime between June 15 and June 19, that you weren't going to make that 0.1 percent adjustment?

Mr. BROOKRESON. It was a question that we felt was very important. This of a secretive procedure without accountability impacts the integrity of how we operated.

Senator MELCHER. Well, is the integrity based on procedure? What I want to sort out, I am interpreting your testimony to not quarrel with that adjustment, 0.1 percent.

Mr. BROOKRESON. As I have reviewed the figures, it looks to be appropriate, sir; yes.

Senator MELCHER. So it was two things on procedure then: if they are going to adjust the baseline, they ought to adjust the baseline and not use the calibration for the adjustment; is that right?

Mr. BROOKRESON. Yes, sir. We felt that that's just an absolutely critical part of a national program. It is going to have to be forthright on what the baseline is and adjust to it.

Senator MELCHER. All right. And it should be public?

Mr. BROOKRESON. Yes, sir.

Senator MELCHER. When you are told to do this without written confirmation, that is part of the procedural question you have; is that correct?

Mr. BROOKRESON. Yes.

Senator MELCHER. Did you have a reaction similar to Mr. Denning, where he said he felt very shaky at that point?

Mr. BROOKRESON. I am not sure I would characterize it as being shaky. I was very displeased that this type of thing would be done.

Senator MELCHER. Were you angry?

Mr. BROOKRESON. Yes, sir.

Senator MELCHER. You were angry?

Mr. BROOKRESON. Yes, sir.

Senator MELCHER. Because you think they were doing something that was outside the norm of what the law calls for?

Mr. BROOKRESON. I am not familiar with exactly what the legal requirements are. It was outside what the written procedure was, and we felt it lacked the integrity that we would like to have.

Senator MELCHER. Integrity?

Mr. BROOKRESON. Yes, sir.

Senator MELCHER. Was it dishonest?

Mr. BROOKRESON. I am not sure whether it's dishonest. It was a very poor policy, in my opinion.

Senator MELCHER. What is "integrity" then?

Mr. BROOKRESON. Well, I give instructions to my field people. I expect them to follow the instructions. They were given that protein instruction. I told them I expected it to be followed as exactly as they possibly could. And to come back and give them an instruction that was contrary to that, to say that we're going to operate at a point other than what the instruction called for, I didn't feel I could.

Senator **Melcher**. Then you are referring to maintaining the integrity of an instruction which is a handbook? Is that how you refer to it?

Mr. **Brookreson**. The integrity of the inspection system, I thought, was compromised by acting in that way.

Senator **Melcher**. The integrity was compromised. I will settle for that. I guess that is open to interpretation as to how severe—how bad that is.

All right. You thought you were correct in making the 0.1 percent adjustment for two reasons, and we have gone over that. I appreciate that, Mr. Brookreson. I appreciate your testimony and your knowledge on this. Might I ask you how long you have been in this business?

Mr. **Brookreson**. I have been with the Department of Agriculture for 13 years.

Senator **Melcher**. Always in grain inspection?

Mr. **Brookreson**. Yes, sir. I started as a grain sampler and worked through the system.

Congressman Marlenee.

Mr. **Marlenee**. Thank you, Senator.

You were aware about the necessity to raise the protein 0.1 of a percent, and it was lowered by 0.1 of a percent in other States; and you finally took action on August 1. And during the interim period, from June 15, when you requested written confirmation, until August 1, the Department was also aware of this lower evaluation in that lab? But I am talking about FGIS, Kansas City.

Mr. **Brookreson**. Yes. We call our biases in. All our information is given to Kansas City.

Mr. **Marlenee**. So they were aware of it.

That is the final point that I wish for the record, Senator.

I, too, thank you, Mr. Brookreson, for coming forward today.

Senator **Melcher**. Thank you.

The next witness is Winston Wilson, president of U.S. Wheat Associates, Inc.

STATEMENT OF WINSTON WILSON, PRESIDENT, U.S. WHEAT ASSOCIATES, INC., WASHINGTON, DC

Mr. **Wilson**. Thank you, Mr. Chairman.

You have a copy of my written testimony that I would like to submit for the record, and I will keep my remarks very brief because you do have a number of witnesses, and I think they are more relevant to the points at issue.

I would like to make two points, though. One, in our view, there was the significant and serious problem with the protein certification process. The NIR values on U.S. certificates were not holding up with the Kjeldahl tests on the importers' end. This had been a constant problem. FGIS did attempt to deal with it and, as Mr. Glickman mentioned earlier, quoting from my testimony, those complaints have virtually all but disappeared.

Maybe some things needed to be done different; we really can't comment on exact procedures. But it is our feeling that whatever mistakes may or may not have been made, FGIS did finally do something to attempt to solve this problem. It was mentioned earlier today that there really had not even been a recalibration of NIR machines for 5 years and, suddenly, there was an attempt to deal with these problems, to get some changes made.

In our view, they have been official, and we certainly think they should be commended from that standpoint because the changes have helped our export markets. They have allowed us to pump some market share up, which we very sorely needed.

With that, I will end my remarks and respond to any questions you might have.

[The prepared statement of Mr. Wilson follows:]

STATEMENT OF WINSTON WILSON
PRESIDENT OF U.S. WHEAT ASSOCIATES, INC.

Mr. Chairman and members of the Committee. I am Winston Wilson, President of U.S. Wheat Associates, a market development organization funded by U.S. wheat producers with the purpose of expanding U.S. wheat exports around the world.

We are not totally aware of all of the issues to be discussed during this hearing today; however, it is our understanding that the primary issue is protein determination and certification by the Federal Grain Inspection Service (FGIS). While I am not prepared to comment on specific FGIS procedures and testing processes, I would like to make some general comments regarding our experience with protein certification in the past and its role in the marketing of U.S. wheat.

World markets for protein wheats, Spring wheats in particular, require a very specific and precise determination of protein levels in order to meet the buyer's needs. From time-to-time in the past there have been intermittent problems with protein certification by FGIS not holding up at the point of destination. However, beginning in mid-July 1986, this problem became extremely persistent and very serious in our Asian protein wheat markets. We are not at all sure precisely what happened, but it is quite clear that practically all of our Spring wheat buyers in Asia began to experience significant differences on a consistent basis between the FGIS certified protein levels and the protein levels which they were obtaining with their own tests at time of receipt of the shipments. These differences were running the range of 2/10 to 6/10 of one percent in almost every case. Had these differences been random sampling and testing errors, they should have resulted in test values both above and below the level certified by FGIS. Unfortunately, beginning in July of 1986, in practically every case the destination Kjeldahl results indicated protein levels significantly below FGIS certified levels. This situation was occurring in Taiwan, Japan, Korea, Malaysia, and Singapore.

The persistence of this problem and the consistent overstatement of protein content convinced us that there was a serious problem with the FGIS protein certification process. Subsequently, we arranged with FGIS a special monitoring program on some specific shipments to Malaysia. Extra samples of these shipments were obtained by FGIS and protein analyses were run by FGIS as well as three independent laboratories selected by U.S. Wheat Associates. An FGIS official was on hand in Malaysis upon arrival of the shipments and supervised the sampling of the cargoes as well as protein testing at destination. Along with the samples taken at the time of unloading, a fifth sample from the original loading samples taken by FGIS was also analyzed. As a result of this exercise, FGIS became convinced that there was a significant and fairly consistent overstatement of protein values on the grade certificate.

Some weeks later, FGIS instituted several changes in their protein testing procedure in order to correct this situation. While the details and impact of these changes can much better be discussed by representatives of the Federal Grain Inspection Service, I will say that, from our viewpoint, we are very pleased that FGIS did take some action to correct this situation, and that since these actions have been taken, complaints of protein discrepancies from Asia have almost totally disappeared. Consequently, U.S. wheat farmers have managed to hang on to these very important markets which were for a period late last year and early this year in severe jeopardy. In fact, as a result of these actions, we believe that our market share in the Malaysian market will increase significantly over the next two years.

I will conclude my remarks with this brief statement and am prepared to answer any questions which you might have.

Senator MELCHER. First of all, Winston, your entire prepared testimony will be made part of the record. I have previously read your prepared testimony and appreciate the points that you make.

The most significant point I found in your testimony was that beginning in July 1986 Kjeldahl results indicated protein levels significantly below FGIS-certified levels. Were those Kjeldahl results in the country of destination?

Mr. WILSON. Yes, sir.

Senator MELCHER. They were. That is the only thing to base, as far as we know, the final determination of protein; is that correct?

Mr. WILSON. Well, certainly, some of the later witnesses can comment on that much better than I can. But it is a chemical test and does, we think, indicate fairly exactly; in the NIR's, at best, an estimate of what the Kjeldahl test will give you, because it is an entirely different process. It is not a chemical test. It is based on light refraction.

Apparently, beginning with the crop-year in 1986, we suspected, at least, that there was significant changes in the varieties that were in the commercial mix and this, somehow, impacted on the results of the NIR machine. But I certainly can't qualify as an expert witness on that. But at least that was the theory that we had. Consequently, there needed to be some adjustment in the NIR process, from our point of view.

Senator MELCHER. As far as you could determine, it was—the earliest point that you were aware of this, at least, was in July 1986?

Mr. WILSON. Well, there had been problems all the time, on a periodic basis. And random errors on either sampling or testing, sometimes the certificate is going to be a little higher than what you get with the Kjeldahl, and sometimes it will be a little lower. Those kind of deviations would be occurring if it were strictly a random error. But suddenly—and we've got some data from Taiwan and Japan and a little bit from Korea, as well. Suddenly, with the new crop in 1986, practically all of the deviations you were finding that the certified level was higher than what the Kjeldahl was revealing.

So something happened about that time. You can almost draw a line across the month of July, and that is when it started happening. Of course, that is also about the time the new crop starts to go through the channels and, apparently, that is when something changed. As to what that was, we really don't know. But I think, probably, it is something to do with the change in the kinds of varieties that were coming through the marketing channel at that time.

Senator MELCHER. Congressman Marlenee.

Mr. MARLENEE. Just do a good job selling the wheat, will you?

Mr. WILSON. It's looking better. It's looking better.

Mr. MARLENEE. Thank you for appearing.

Senator MELCHER. Thank you, Winston.

Our next witness is Ray Rogers, senior vice president for United Grain Corporation, Portland.

STATEMENT OF RAYMOND R. ROGERS, SENIOR VICE PRESIDENT, UNITED GRAIN CORPORATION, PORTLAND, OR

Mr. ROGERS. Thank you Mr. Chairman, and members of the committee. I appreciate the opportunity to deliver my statement before you this morning. My name is Raymond R. Rogers, and I am the senior vice president in charge of operations for United Grain Corporation, headquartered in Portland, Oregon.

United Grain Corporation is a regional firm involved in merchandising and exporting grain on a worldwide basis. Our company owns and operates two modern grain elevators in the State of Montana, one in Colorado, one in Nebraska, and a barge shipping elevator located in Clarkston, Washington, which is in the Lewiston area.

We also operate a large terminal grain export elevator located in Vancouver, Washington, which is on the Columbia River, across from Portland, Oregon. This facility exported over 121 million bushels of wheat during the period April 1, 1986, through March 31, 1987. Included in this volume is approximately 40 million bushels of Dark Northern Spring wheat. Most of the Spring wheat we handle originates in Montana and North Dakota. Smaller amounts originate in Idaho, Oregon, and Washington.

The State of Washington Grain Inspection Department samples and runs official proteins on all of the Spring wheat coming in to or going out of the export elevator in Vancouver. This lab is under the direct supervision of the Federal Grain Inspection Service [FGIS] located in Olympia, Washington. Prior to that, before Olympia was formed, we were under the supervision at Portland, Oregon. The FGIS lab in Olympia, Washington, is under direct supervision of the FGIS lab in Kansas City, Missouri. If either the shipper or receiver questions the accuracy of the State official protein results—I want to go over that again—if either the shipper or the receiver questions the accuracy of the State official protein results, they can request that the State send a portion of the official unloading sample to the Federal lab in Olympia for a Federal appeal on the protein results. If either party still questions Olympia's lab results, they can request a board appeal, which is run in Kansas City, Missouri. These results are final, and the shipper will be paid on these final results—not Vancouver, Washington, results. In large part, the basis for these appeals can be found in the differences of protein results recorded by the lab at the shipping point versus the results indicated by the lab at the point of destination.

While any system will have some percentage of results which vary from time to time, it is essential to the free flow of grain that there exists a uniformity of testing procedures and results between various labs, as well as a central clearing house which can fairly and accurately correct those instances where differences occur.

To that end, we are here today to support the continued efforts put forth by the Federal Grain Inspection Service, particularly over the past few years. Another important aspect to this system is the need to maintain integrity of results between our system of protein identification and that of our foreign customers.

During the latter part of 1986, we began receiving numerous and strong complaints of variations in landed protein going into several different foreign countries. We, along with other exporters and trade groups, contacted Lloyd Brown of FGIS, Olympia, Washington, and Dr. Cliff Watson of FGIS, Kansas City, Missouri, concerning these serious variances in protein results. They, in turn, contacted Dr. William Shuey (phonetic) in Washington, DC. Together, they took investigative steps to attempt to explain the wide differences between loaded and discharge protein results.

As you can imagine, we were deeply concerned over the possible loss of export business, should this inconsistency of results not be properly and accurately resolved. I have included a sample listing of some variations between loaded and landed protein results of which we are aware to show you the significant difference of this issue. This is attached to my prepared statement. [See page 208.]

It appears, from our information, that FGIS was seriously investigating these complaints over a long period of time. During their investigation, they apparently became convinced that their protein instruments were getting consistently higher readings. On April 15, 1987, they ordered all official grain labs to lower the bias on their machines and reduce protein levels 0.2 of 1 percent. We should point out, at the time of this order, United Grain Corporation owned considerable inventory in our Montana, Clarkston, and Vancouver elevators, which was suddenly lowered 0.2 of 1 percent, causing a large monetary loss to our company. In other words, if you owned the inventory, and you had paid for it as 14, the next day it was 13.8. Even so, we strongly supported FGIS for taking this bold action, which we think was justified in view of the many complaints that we were receiving and the results of their own investigation.

As we said earlier, it is imperative, in our judgment, that results of protein tests be kept in balance between our system and those of our customers overseas. To not do so is to put at risk maintaining a vigorous export program in the face of stiff worldwide competition. We believe the actions taken by the FGIS to respond to overseas complaints, as well as to bring uniformity within the various regional labs throughout the U.S. system, to have been absolutely essential.

For the future, we think that the FGIS should continue to move forward to improve the present system and strive to get even greater uniformity and accuracy. They must gain the confidence from all parties using this important system. We all have too much at stake, the producer, exporter, and consumer alike, for this not to be given a top priority.

Thank you for the opportunity to address you today.

[The prepared statement of Mr. Rogers with a sample listing of some variations between loaded protein and landed protein results follow:]

STATEMENT OF

RAYMOND R. ROGERS

SENIOR VICE PRESIDENT

UNITED GRAIN CORPORATION
PORTLAND, OREGON

to the

SENATE AND HOUSE OF REPRESENTATIVES
AGRICULTURE COMMITTEES

November 10, 1987

Thank you Mr. Chairman and members of the Committee. I appreciate the opportunity to deliver my statement before you this morning. My name is Raymond R. Rogers and I am the Senior Vice President in charge of operations for United Grain Corporation headquartered in Portland, Oregon.

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During the later part of 1986 we began receiving numerous and strong complaints of variations in landed protein going into several different foreign countries. We, along with other exporters and trade groups, contacted Lloyd Brown of FGIS Olympia, Washington, and Dr. Cliff Watson of FGIS Kansas City, Missouri, concerning these serious variances in protein results. They, in turn, contacted Dr. William Shuey in Washington, D.C. Together they took investigative steps to attempt to explain the wide differences between loaded and discharge protein results.

As you can imagine, we were deeply concerned of the possible loss of export business should this inconsistency of results not be promptly and accurately resolved. I have included a sample listing of some variartions between loaded and landed protein results of which we were aware, to show the significance of this issue.

It appears from our information that FGIS was seriously investigating these complaints over a long period of time. During their investigation they apparently became convinced that their protein instruments were getting consistently higher readings. On April 15, 1987, they ordered all official grain labs to lower the bias on their machines and reduce protein levels two-tenths of a percent (0.2). We should point out that at the time of this order United Grain Corporation owned considerable inventory in our Montana, Clarkston, and Vancouver elevators which was suddenly lowered two-tenths (0.2) of 1 percent, causing a large monetary loss to our company. Even so, we strongly supported FGIS for taking this bold action which we think was justified in view of the many complaints that we were receiving and the results of their own investigation.

As we have said earlier, it is imperative in our judgement that results of protein tests be kept in balance between our system and those of our customers overseas. To not do so is to put at risk maintaining a vigorous export program in the face of stiff worldwide competition. We believe the actions taken by the FGIS to respond to overseas complaints, as well as to bring uniformity within the various regional labs throughout the U.S. system, to have been absolutely essential.

For the future, we think that FGIS should continue to move forward to improve the present system and strive to get even greater uniformity and accuracy. They must gain the confidence from all parties using this important system. We all have too much at stake--producer, exporter, and consumer alike--for this not to be given top priority.

Thank you for the opportunity to address you today.

Attachment:

Ship Date	Vessel	Loaded Protein	Landed Protein
09/08/86	M.V. KEE INVESTMENT	14.00	13.62
09/15/86	M.V. NEW MAIL	14.00	13.65
12/19/86	M.V. GERALIA	14.50	13.70
"	" "	14.50	13.60
"	" "	14.50	13.78
"	" "	14.50	13.50
07/12/86	M.S. MING SPRING	14.70	14.47*
10/26/87	M.V. EASTERN GLORY	14.10	13.70*
02/26/87	M.S. MING WINTER	14.60	14.28*

* These proteins were tested by the foreign buyer in the U.S. using an independent lab employing the Kjeldahl system.

Senator **Melcher**. Mr. Rogers, thank you for your testimony. Would it be inconvenient for you to remain? Congressman Marlenee had to go for a vote. He does have a couple of questions he would like to ask of you when he returns from that vote on the House floor.

Mr. **Rogers**. Sure.

Senator **Melcher**. All right. In the meantime, we will call our next witnesses, our last set of witnesses, the Administrator, Kirk Miller. I'm not sure how many of these people are here, Leroy Baker, Cliff Watson, Larry Zehm and Wilda Martinez and Dr. McDonald. If you are all here, please approach the witness table.

Mr. Miller, I looked through your prepared testimony, and we are going to let you proceed any way you choose. In any event, all of your prepared testimony will be made part of the record. Proceed as you desire.

STATEMENT OF W. KIRK MILLER, ADMINISTRATOR, FEDERAL GRAIN INSPECTION SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC.; ACCOMPANIED BY LeROY BAKER, PROTEIN COORDINATOR, USDA, FEDERAL GRAIN INSPECTION SERVICE, MOSCOW, ID; CLIFF WATSON, CHIEF, QUALITY CONTROL TESTING, USDA, FEDERAL GRAIN INSPECTION SERVICE, KANSAS CITY, MO; LARRY ZEHM, SUPERVISOR, USDA, FEDERAL GRAIN INSPECTION SERVICE, MOSCOW, ID; WILDA MARTINEZ, NATIONAL PROGRAM LEADER, PRODUCT QUALITY, USDA, AGRICULTURAL RESEARCH SERVICE, WASHINGTON, DC; AND CLARENCE McDONALD, CEREAL CHEMIST, NORTH DAKOTA STATE UNIVERSITY

Mr. **Miller**. We will try to summarize our comments, and we do appreciate the fact you are going to insert the entire document for the record.

I have several folks with me this afternoon. We have Mr. LeRoy Baker who is the protein coordinator from the Federal Grain Inspection Service field office in Moscow, Idaho, Dr. Clarence McDonald who is with the Department of Cereal Science and Food Technology at North Dakota State University, Larry Zehm, the field office manager from Moscow, Idaho, Cliff Watson who is the Assistant to the Director of the Standardization Division in our Kansas City Technical Center, and Wilda Martinez who is Chairperson of the Independent Protein Study team, which I appointed last summer to look at our protein operation.

We have other folks in the audience who will help us, as necessary, to respond to questions.

To adequately address your concerns, I will share a brief chronology of the events of the past few months, as well as a description of the Agency's past actions, and plans for improving the program.

Recently, a steadily growing number of foreign buyers complained strenuously that shipments of U.S. Hard Red Spring wheat have not contained the level of protein certificated by FGIS. In December 1986 FGIS initiated a study of several Hard Red Spring export shipments to specifically monitor the level of protein at both origin and also at destination. This study confirmed that the NIR readings needed to be aligned more closely with the Kjeldahl laboratory protein analysis.

As a result of the study and increasing complaints from foreign buyers, FGIS implemented a 0.2 percent lowering of the baseline for Hard Red Spring wheat, effective April 15, 1987. The General Accounting Office has examined the basis for this change and has verified the need and concurred with the statistical basis for the change.

On May 4, 1987, improved standard reference samples were placed into effect for detecting instrument drift and biasing of instruments. These samples had been prepared and mailed to inspection points on April 8—and carried protein values that were determined prior to the 0.2 percent change on April 15. Therefore, when these new national reference samples were put into use, it was necessary to lower their baseline values, which were mailed with the samples on April 8, to maintain the April 15 change.

The new baseline value for the new national reference samples reflects the April 15 0.2 percent reduction. This is not in line with the understanding on the part of the folks in Montana.

Also, other programs were initiated the first week in May to improve the protein testing program. A new protein handbook was issued to assure that proper and uniform procedures were used to operate the NIR for protein. Automatic feeders were installed on grinders to promote uniform grinding of the sample.

Original inspection results and samples were monitored directly by the Quality Control Branch at the Technical Center in Kansas City. Two sublots for each lot of exported Hard Red Winter and Hard Red Spring wheat have been monitored by the Quality Control Branch at our Technical Center on both the NIR instrument and the Kjeldahl unit. A more accurate calibration equation has been developed, along with a procedure for continual updating of the calibration equation on an annual basis.

Based on our extensive monitoring of the system inspection results, on June 15, 1987, FGIS contacted the official inspection laboratories and requested the labs to maintain the instrument bias on the plus side of the standard reference sample values. The laboratories are required to rebias if the NIR protein values are more than plus or minus 0.15 percent from the standard reference sample baseline value.

For example, if the standard reference sample values average 13.7 percent, the NIR's must be rebiased if they fall below 13.55 or exceed 13.85. On the basis of monitoring samples sent to the Technical Center, more NIR's appeared to be reading low than high, when compared to the reference Kjeldahl method. Therefore, a request was issued to keep the instruments biased between 13.7 and 13.85, which is still within the stated allowable tolerance, in an attempt to keep the NIR's closer to the Kjeldahl reference method.

Because the request was within the existing standard reference sample baseline, FGIS did not issue a written instruction. Some locations apparently added their own interpretation that the standard reference sample values were raised 0.1 percent. This was not consistent with the directions given by Quality Control Branch of FGIS.

The August date referred to by the Montana Grain Growers Association as a time for an additional raise in protein by 0.1 of a percent may be linked to plans by the FGIS to place a new Hard Red

Spring wheat calibration into effect. Implementation of the new calibration has been delayed to provide time to resolve some questions raised during this development and assure that the calibration equation provides the most accurate results.

The new calibration equation approved by the Agricultural Research Service is scheduled to be installed before the end of the year. Since all instruments must be resloped and biased, using the new calibration, there will be varying amounts of increase and/or decrease in the new baseline over the protein range.

We take exception to the Montana Grain Growers' statement that Montana's Hard Red Spring wheats were adjusted 0.5 of a percent. Apparently, the association arrived at the figure adding the initial April 15 0.2 percent change with the May 4 implementation of the new national standard reference samples, which were established and analyzed prior to April 15. The May 4 change that has been alluded to only transferred the April 15 0.2 percent bias adjustment of the baseline to the new standard reference samples.

In addition, the June 15 request to maintain the NIR's on the plus side of the specified tolerance is probably the other 0.1 percent that they are alluding to, and this is based on monitoring of samples after the other procedural changes took effect. Therefore, we find that 0.5 percent figure mentioned by the Montana Grain Growers is in error.

Further, we take exception to the Montana Grain Growers Association's assertion that they did not have access to the information in an equal manner to others. However, to ensure an impartial review, the Assistant Secretary for Marketing and Inspection Services has requested the Inspector General to conduct a review of this protein testing program.

FGIS either has or is in the process of implementing several procedural changes to increase the precision of the protein testing program, including the following actions.

One, from April 15 to May 1, 1987, FGIS conducted training schools for all NIR protein operators.

Two, on May 4, 1987, FGIS implemented national standard reference samples with more robustness for biasing of NIR's to replace regional reference samples.

Three, FGIS senior management continues to monitor the protein determination program for other needed changes.

Four, a blue ribbon committee, representing government, academia, and the grain industry was established on June 26 to review and recommend modifications to the FGIS protein certification program. This committee is chaired by Ms. Wilda Martinez, National Program Leader for Product Quality for the Agricultural Research Service. Ms. Martinez is with us today and in a moment I will ask her to make a few remarks about the work of the committee.

Five, FGIS continues to participate in collaborative studies with other private testing laboratories such as the Doty Laboratories and Ingman Laboratories and others.

For reasons stated previously, FGIS refutes assertions of the Montana Grain Growers Association that a 0.5 percent adjustment to protein levels occurred. We expect that our initial action, coupled with the procedural changes identified and listed above, will bring improved accuracy and uniformity to the FGIS protein certification program.

[The prepared statement of Mr. Miller follows:]

STATEMENT OF W. KIRK MILLER, ADMINISTRATOR, FEDERAL GRAIN INSPECTION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

Testing wheat for protein content is authorized under Section 7(b) of the United States Grain Standards Act (USGSA), as amended. All official protein analyses under the USGSA are required to be performed in accordance with procedures prescribed in Book V of the Federal Grain Inspection Handbook and must be performed only by authorized or licensed employees of the Federal Grain Inspection Service (FGIS) or licensed employees of delegated/designated agencies.1/

There are presently two accepted methods of determining protein levels in wheat. Near-infrared reflectance (NIR) devices are generally used in field testing and the Kjeldahl method may be used in laboratory conditions for official protein determinations. Near-infrared reflectance analysis is a spectrophotometric method for determining a sample's constituents by measuring the amount of reflected light from a sample in the near-infrared region of the spectra at specific wavelengths. The Kjeldahl method is recognized worldwide as the standard method for determining protein and is used by FGIS as the standard reference method for calibrating the NIR instrument. The Kjeldahl method is a chemical digestion method that determines the amount of nitrogen present from which protein is determined.

Recently a steadily growing number of foreign buyers complained strenuously that shipments of U.S. Hard Red Spring wheat have not contained the level of protein certificated by FGIS. In December 1986 FGIS initiated a study of several Hard Red Spring wheat export shipments to specifically monitor the level of protein at origin and destination. This study confirmed that the NIR readings needed to be aligned more closely with the Kjeldahl laboratory protein analysis. As a result of the study and increasing complaints from foreign buyers, FGIS implemented a 0.2% lowering of the baseline for Hard Red Spring wheat effective April 15. Standard reference samples (SRS) are used by operators for biasing the instrument to the baseline. The General Accounting Office has examined the basis for this change and has verified the need and concurred with the statistical basis for the change.

DEFINITIONS

NIR certification of wheat protein is a technical process that involves many terms that may be unfamiliar or misunderstood. For this reason we offer the following definitions that are key to discussions of the many actions taken by FGIS to resolve the protein complaints.

1/ Most farmers deliver and sell their commodities under unofficial grades provided by the elevator to which they delivered grain. The grades provided by these elevators including protein results are not regulated by FGIS.

CALIBRATION is the term used to describe the implementation of a complex mathematical equation into a NIR instrument which will best predict the protein content determined by the Kjeldahl reference method. The equation is programmed into the internal memory system of the instrument. The calibration equation was last updated in 1982.

SLOPE is the term used to describe how well the equation accurately predicts the Kjeldahl protein over the expected protein range. The closer the slope value is to one (1), the more accurate are the NIR prediction results. Slope adjustments are necessary periodically due to varying physical characteristics within instruments and wheats.

BIAS is the term used to describe the amount of shift of the equation to accurately predict the Kjeldahl protein. The bias of the instrument is checked routinely on a daily basis for situations such as change in wheat lots, change in operators or power fluctuations.

BACKGROUND

NIR instruments are very sensitive. The results they produce are affected by a multitude of factors, including temperature, humidity and dust. For this reason, official NIR instruments are located in controlled environments and closely monitored for accuracy. NIR protein results from individual inspection points are compared with a Kjeldahl reference laboratory at the FGIS Technical Center in Kansas City, MO.

NIR protein discrepancies of plus or minus 0.10% or 0.20% can normally be attributed to sampling, instrument and operator variability. However, beginning in the summer of 1986 complaints of lower-than-certificated protein values increased in frequency. Further, according to the complaints, the amount of discrepancy between origin and destination was greater than the acceptable tolerance which is generally acknowledged to be plus or minus 0.4% at the 95% confidence level.

FGIS gave briefings on the situation to the Executive Committee of the U.S. Wheat Associates on March 17, 1987; the Grades & Weights Committee of the National Grain & Feed Association on March 18, 1987; and the Board of Directors of the North American Export Grain Association on April 9, 1987. Finally, the FGIS Advisory Committee received a similar briefing on April 13, 1987. As a result of these discussions, the Advisory Committee voted unanimously to support a 0.2% lowering of the HRS standard reference sample baseline on April 15, 1987.

COMMENT ON MONTANA GRAIN GROWERS ASSERTIONS

The Montana Grain Growers Association has alleged that from April 15 to June 15, 1987, protein levels on Montana Hard Red Spring wheats were adjusted 0.5%. They have indicated that the initial 0.2% reduction on April 15 reflected an incorrect calibration that had been in place for some time. They have also indicated that another 0.2% downward adjustment occurred on May 4. Finally the Montana Grain Growers Association alleges that a 0.1% upward adjustment was ordered on June 15. We do not agree with these assertions and welcome the opportunity to respond to them.

On April 15, 1987, the baseline value of the HRS standard reference samples were lowered by 0.2% to compensate for the overstating of protein content by the NIR's. We do not believe that this action is under question by the Montana Grain Growers Association.

On May 4, 1987, improved standard reference values (reference samples) were placed into effect for detecting instrument drift and biasing instruments. These samples had been mailed to inspection points on April 8 and carried protein values that were determined prior to the 0.2% change on April 15. Therefore, it was necessary to lower the baseline value mailed with the standard reference samples to maintain the April 15 change. The new baseline value for the new national reference samples reflects the April 15 0.2% reduction.

Also other programs were initiated the first week in May to improve the protein testing program. A new protein handbook was issued to assure that proper and uniform procedures were used to operate the NIR for protein. Automatic feeders were installed on grinders to promote uniform grinding of the sample. Original inspection results and samples were monitored directly by the Quality Control Branch at the Technical Center in Kansas City. Two sublots for each lot of exported HRW and HRS are monitored by Quality-Control Branch at Technical Center on both the NIR instrument and Kjeldahl unit. A more accurate HRS-NIR calibration equation was developed along with a procedure for continual updating of the calibration equation on an annual basis.

On June 15, 1987, FGIS contacted the official inspection laboratories and requested the labs to maintain the instrument bias on the plus side of the standard reference sample values. The laboratories are required to rebias if the NIR's protein values are more than + or - 0.15% from the standard reference sample baseline value. For example, if the standard reference sample values average 13.7, the NIR must be rebiased if they fall below 13.55 or exceed 13.85. On the basis of monitoring samples sent to the Technical Center, more NIR's appeared to be reading low than high when compared to the reference Kjeldahl method. Therefore, a request was issued to keep the instruments biased between 13.7 and 13.85 (still within the stated allowable tolerance) in an attempt to keep the NIR's closer to the Kjeldahl reference method. Because the request was within the existing standard reference samples baseline, FGIS did not issue a written instruction. Some locations apparently added their own interpretation that the standard reference sample values were raised 0.1%. This was not consistent with directions given by Quality Control Branch, FGIS.

The August date referred to by the Montana Grain Growers Association as the time for an additional raise in protein by 0.1% may be linked to plans by FGIS to place a new Hard Red Spring wheat calibration into effect. Implementation of the new calibration has been delayed to provide time to resolve some questions raised during its development and assure that the calibration equation provides the most accurate results. The new calibration equation, approved by the Agricultural Research Service, is scheduled to be installed before the end of the year. Since all instruments must be resloped and biased using the new calibration, there may be varying amounts of increase and/or decrease in the new baseline over the protein range.

We take exception to the Montana Grain Growers Association's statement that Montana's Hard Red Spring wheats were adjusted 0.5%. Apparently the association arrived at the figure by adding the initial April 15, 0.2% change with the May 4 implementation of new national standard reference samples which were analyzed prior to April 15. The May 4 change only maintained consistency in the April 15 0.2% adjustment of the baseline for the new standard reference samples baseline. In addition, the June 15 request to maintain the NIR's on the plus side of the specified tolerance could account for the remaining 0.1%. However this could have reduced the original 0.2% change to less than that amount. Therefore, we find the 0.5% figure in error. Further, we take exception to the Montana Grain Growers Association assertion that they did not have access to the information in an equal manner to others.

However, to assure an impartial review, the Assistant Secretary for Marketing and Inspection Services has requested the Inspector General to conduct a review of this protein testing program.

Other Actions by FGIS to Assure Accurate Protein Measurement

FGIS either has or is in the process of implementing several procedural changes to increase the precision of the protein testing program, including the following actions:

1. From April 15 to May 1, 1987 FGIS conducted training schools for NIR protein operators.

2. On May 1, 1987 FGIS issued a new handbook which standardized operational procedures in an effort to eliminate possible sources of error.

3. On May 1, 1987 FGIS implemented national standard reference samples with more robustness for biasing of NIR's to replace regional reference samples.

4. Automatic feeders have been installed on grinders to assure uniform grinding.

5. Original inspection results are monitored directly by the Quality Control Branch at the Technical Center.

6. Established a procedure whereby two sublots from each export lot are monitored on the Kjeldahl reference unit at the Technical Center.

7. A more accurate HRS-NIR calibration has been developed along with a method to update it on at least an annual basis.

8. FGIS senior management continues to monitor the Protein determination program for needed changes.

9. A blue ribbon committee representing government, academia, and the grain industry was established on June 26 to review and recommend modifications to the FGIS protein certification program. This committee is chaired by Ms. Wilda Martinez, National Program Leader for Product Quality for the Agricultural Research Service.

10. FGIS will continue participation in collaborative studies with private testing laboratories.

11. FGIS has initiated action to upgrade the training and classification of the protein instrument operators.

SUMMARY

For reasons stated previously in this background paper, FGIS refutes assertions of the Montana Grain Growers Association that a 0.5% adjustment to protein levels occurred and that any action taken by FGIS was done without public announcement and knowledge.

We expect that our initial action coupled with the procedural changes identified and listed above will bring improved accuracy and uniformity to the FGIS protein certification program.

Mr. MILLER. At this time I would like to—with your permission—call on Wilda Martinez to make just a few comments about the Independent Protein Program Study Committee.

Senator MELCHER. Please proceed, Mrs. Martinez.

STATEMENT OF WILDA MARTINEZ, NATIONAL PROGRAM LEADER, PRODUCT QUALITY, USDA, AGRICULTURAL RESEARCH SERVICE, WASHINGTON, DC

Mrs. MARTINEZ. In June 1987 Mr. Kirk Miller, Administrator of the Federal Grain Inspection Service, requested that the Administrator of the Agricultural Research Service, or ARS, who is Dr. Terry B. Kinney, Jr., permit me, Wilda Martinez, as a member of the National Program Staff for Product Quality, to lead, as Chairman, a Protein Study Team with the stated objective to establish a protein program without equal and provide optimum credibility and integrity within both the domestic and export wheat marketing communities.

The team members identified in this request provide a unique blend of expertise needed to address this most critical objective. They include Mr. Karl Norris, an ARS scientist, father of the near infrared technology and member of the Board of Agriculture of the National Research Council; Dr. David E. Honigs, Department of Chemistry, University of Washington, Seattle, WA, a theoretical spectroscopist with stature and demand as a consultant; Dr. Jeremy S. Wu, Chief of the Statistics Branch of the Agricultural Marketing Service of the USDA; and Dr. David Hopkins, formerly Quality Control Manager for the Dickey-john Co., a manufacturer of the near infrared instruments, and presently a member of the chemistry department of the Kellogg Co.

Due to the time required for Dr. Hopkins to obtain clearance from his company to participate in this activity, the first meeting of the Protein Study Team did not take place until September 30, 1987.

The team was charged to conduct the following: A review and evaluation of methodologies used to calibrate, standardize, and approve NIR instruments; a review and evaluation of quality control programs for instrument standardization at different locations and calibration maintenance; and finally, a review and evaluation of training programs and testing protocols.

The time involved in this activity thus far has provided little more than an opportunity to obtain a firsthand overview of the procedures detailed in the Grain Inspection Handbook, Book 5, and to identify those specific aspects which the team determined were critical to the integrity of the system.

The team is fully aware that although the precision of the NIR technology is generally recognized as better than the referenced Kjeldahl method for nitrogen or protein content of a grain, the accuracy or the true value of the NIR measurement can be no greater than that of the reference chemical method, namely 0.2 percent.

Given the fact that certain components of the industry attach economic significance to values as low as 0.1 percent protein, the team considers it to be essential to identify and eliminate all aspects of this technology that might contribute to the introduction of systematic errors, that is, errors which produce values all higher or all lower than true values, and to assure that the residual error inherent in any analytical system is truly random.

The team also recognizes that the scope of the current system for protein determination in wheat is of a scale and diversity that is unique in the experience of this technology and, consequently, may require monitoring procedures not previously recognized as essential in system of lesser magnitude.

Thank you, Mr. Chairman.

Senator MELCHER. Thank you, Mrs. Martinez.

Mr. Miller, why wasn't the near infrared equipment recalibrated every year?

Mr. MILLER. Sir, I really don't know the answer to your question. I would have to defer to some of the career people who were here during that time period. Let me ask Dr. Watson who was in charge of that program.

Senator MELCHER. Do you have an answer, Dr. Watson?

Dr. WATSON. The instruments were not recalibrated for that period of time because it was not the policy of the Federal Grain Inspection Service.

Senator MELCHER. Would you move the mike, please. You will have to just bring it closer to you, that's all.

Dr. WATSON. Thank you. The instruments were not recalibrated during that period of time because it was not the policy of FGIS to recalibrate those types of instruments. They felt it was the responsibility of the manufacturer. I had requested and made several attempts or requests that they should be recalibrated, but those requests were denied.

Senator MELCHER. Who did you make the requests to?

Dr. WATSON. Upper management in FGIS.

Senator MELCHER. And they were denied.

And so you don't know anything about this, Mr. Miller? Why not?

Dr. WATSON. Can I answer that for him? I would have to say, in defense of Mr. Miller, he was not our Administrator at the time.

Senator MELCHER. Well, who was the Administrator then, Mr. Watson?

Dr. WATSON. Dr. Kenneth Gilles.

Senator MELCHER. Do you keep records of these requests?

Dr. WATSON. I think I have copies of most of the requests. Yes, I do.

Senator MELCHER. So the Administrator's office ought to have them, too?

Dr. WATSON. I would think so.

Senator MELCHER. How long have you been Administrator, Mr. Miller?

Mr. MILLER. Just over a year.

Senator MELCHER. And you are not aware of this?

Mr. MILLER. I am not aware of the requests that came forward during that time period or the rationale for decisions for FGIS policy, or why there wasn't an effort made.

Senator MELCHER. Do you have any opinion, Dr. Watson, why your recommendation was not accepted?

Dr. WATSON. It was my understanding that it was the feeling of the Agency that this should be a responsibility of the manufacturers, to maintain the calibration of these instruments.

Senator MELCHER. It was the feeling of the Agency?

Dr. WATSON. That was my understanding.

Senator MELCHER. How long have you been with the Agency?

Dr. WATSON. Since 1978.

Senator MELCHER. How long have you used near infrared equipment?

Dr. WATSON. I have been associated with it since its invention by Dr. Karl Norris.

Senator MELCHER. Which was when?

Dr. WATSON. Back in about 1967.

Senator MELCHER. And your experience when you joined the FGIS in 1978, were they or were they not recalibrated every year?

Dr. WATSON. They were not recalibrated every year. In fact, they started using them, as you know—or probably don't know—in 1978 as the official method. Then they were recalibrated in 1982, but not since then.

Senator MELCHER. That was 4 years.

Dr. WATSON. Well, actually 5 years; it is now 1987.

Senator MELCHER. No. I mean from 1978 to 1982 was 4 years.

Dr. WATSON. I believe so.

Mr. MARLENEE. Senator, would you yield, briefly?

Senator MELCHER. Briefly.

Mr. MARLENEE. Briefly.

You said that requests had been made to the Administrator, who was Secretary—at that time—Gilles?

Dr. WATSON. No. I believe I said my request was made to upper management.

Mr. MARLENEE. Upper management.

Dr. WATSON. To the Division Directors, it would go.

Mr. MARLENEE. But the Secretary was Gilles at that time?

Dr. WATSON. The Administrator of FGIS.

Mr. MARLENEE. The Administrator was Secretary—was Gilles.

Dr. WATSON. That is right, Dr. Gilles.

Mr. MARLENEE. And he, is he not, still Assistant Secretary?

Dr. WATSON. He is the Assistant Secretary.

Mr. MARLENEE. Thank you.

Senator MELCHER. I guess the one point that isn't clear is that there was a 4-year period when they were not recalibrated; the statements made by previous witnesses is they should be recalibrated every year. Is that correct in your judgment or not?

Dr. WATSON. Yes, indeed, they should be.

Senator MELCHER. And so from 1978 to 1982, they were recalibrated once—I believe that is 4 years. But your request is on file and was consistently denied, I take it, because you would make that request every year?

Dr. WATSON. I think I made it almost every year—1981 to present—yes.

Senator MELCHER. Mr. Miller, you just don't know about this? Where were you before? I hate to ask this, but maybe I should know more about your background. You were not with FGIS, I take it.

Mr. **Miller**. I was not with FGIS, sir. I was the head of a research-oriented trade association in Wisconsin.

Senator **Melcher**. What kind of trade association?

Mr. **Miller**. The American Malting Barley Association.

Senator **Melcher**. Malting Barley.

Mr. **Miller**. Yes, sir.

I would like to comment about the calibration again while we are still on that subject. We have asked for a new recalibration to be developed. We put it on an expedited schedule, in cooperation with the Agricultural Research Service and the Agricultural Marketing Service, with whom we have a contract to do our statistical work. That equation has been developed.

We had planned to implement that equation by August 1. Some problems developed in the final tests causing a delay. We have, within the last week, received the clearance letter from the Agricultural Research Service that we should implement the new equation.

Senator **Melcher**. I find that slightly ridiculous, if I interpret your answer correctly. You are running the FGIS, and you are saying that you can't get recalibration unless Agricultural Research Service says yes?

Mr. **Miller**. Sir, we tried to involve the outside scientist, Dr. Karl Norris, who is the father of the NIR.

Senator **Melcher**. I understand all that. I am just asking a very practical question. If you want those things recalibrated, don't you have the moxie, the authority to get them recalibrated yourself, on your own?

Mr. **Miller**. We do not have the staff expertise within FGIS at this time. We need help from our sister agencies.

Senator **Melcher**. You can't have the Secretary of Agriculture make a decision on whether ARS is going to agree to provide the technical and scientific advice to do the recalibrating?

Mr. **Miller**. We did not float a recommendation to the Secretary's office. Our sister agencies agreed to participate in the recalibration.

Senator **Melcher**. You know, there are some things that I am just getting tired of about this administration, Mr. Miller, and I'd hope I wouldn't get tired of you. But this idea that the answer that was given to Dr. Watson was that it ought to be the responsibility of the manufacturer to recalibrate; that was the attitude of your predecessor. I mean I find that ridiculous.

If you are running a department and you've got an instrument that you want to be accurate, I don't think you give that kind of response to the people out in the field that have to carry out the use of this instrument, to say, "Well, the manufacturer ought to do it," and then nothing is done.

I don't want to quarrel with you too much, but I don't want to have answers from you, Mr. Miller, that indicate there is some sort of a mutual respect between you and another agency, like Agricultural Research Service who has, as far as I know, a pretty good record of doing what they are requested to do by anybody that has any authority at all to ask them to do something. So let's get on with this, and let's try to hold down the vague answers, because we want some specific answers on this.

In this series of changes that occurred over the past several months, the testimony of people who have done this for years is to the effect that when the changes are made, while they may be made orally to begin with, written notifications of that change always follows.

Why did that break down on June 15?

Mr. **MILLER**. I will accept responsibility for the breakdown, sir. It was explained to me at that time that we were looking at a number of locations where the NIR results were lower than the Kjeldahl reference value. This indicated that a bias adjustment was needed at some locations. I was and continue to be told that it is a longstanding practice of the Agency to initiate bias adjustments without written notification. A written instruction is issued for any baseline change or calibration.

When it was brought to my attention and in view of past practices I made a management decision that a written instruction was not necessary. In retrospect, we probably should have done it differently.

Senator **MELCHER**. When did you make that decision?

Mr. **MILLER**. I think on June 3.

Senator **MELCHER**. June 3?

Mr. **MILLER**. Yes, sir.

Senator **MELCHER**. Why did you make that decision?

Mr. **MILLER**. Why did I make that decision? Again,——

Senator **MELCHER**. Somebody brought to your attention, "This is our usual procedure," and you made a decision that there wouldn't be any written verification. Why?

Mr. **MILLER**. Again, I made the decision because, it was explained to me that this was a bias adjustment, which did not require written verification. And, again, had it been a recalibration or a change in the baseline value, it would have required written verification. I agreed with that recommendation or that comment at that time.

Senator **MELCHER**. Well, maybe I could agree with it if I know who made it to you?

Mr. **MILLER**. Well, I had assembled in a meeting on June 3 the head of our Quality Control Branch, the head of our Research and Development Branch and the Division Director responsible for the Standardization Division.

Senator **MELCHER**. The Quality Control Branch is whom?

Mr. **MILLER**. Dr. Watson.

Senator **MELCHER**. Did you make this suggestion, Dr. Watson, that there should not be any written confirmation of this?

Dr. **WATSON**. I don't recall if I did or not. I really don't know. I can't answer that question.

Senator **MELCHER**. Well, you started in 1978, is that right, with FGIS?

Dr. **WATSON**. Yes.

Senator **MELCHER**. Is it, as these grain inspectors and grain directors, testing directors earlier stated, that it is always done, according to the procedures outlined in the Handbook, and those procedures are written notification?

Dr. **WATSON**. My recollection is that any time we request that a bias change be made, we made a phone call on that bias change and followed it up with a note to that effect.

Senator Melcher. Well, you don't recall just how, in this meeting on June 3 with Mr. Miller, this recommendation was made by you, but do you agree that there was a recommendation made that it was not to have any written verification?

Dr. Watson. That is my understanding, and there could be some misunderstanding of this, but I will give you my recollection of it. At the meeting we decided there was a need to bring the adjustment of the instruments up 0.2 percent protein. 0.1 percent was to be made with a bias change prior to August 1; the other 0.1 percent would be made when we implemented the new calibration equation and new reference samples. The one-tenth bias change we would do verbally by telephone, and there would be no written confirmation of that. That is my recollection. Now, I could be wrong.

Mr. Marlenee. Wouldn't it be unusual, Dr. Watson, if somebody requested a written confirmation not to give a written confirmation?

Dr. Watson. I would say, depending on what the request is, I would say no, it is not unusual.

Mr. Marlenee. If you had a request, a request for a written confirmation from one of the managers of the testing laboratories, be it private or State, wouldn't it be unusual not to give them a written confirmation?

Dr. Watson. Yes, it would.

Mr. Marlenee. Thank you.

Senator Melcher. Were you aware that Mr. Brookreson requested that?

Dr. Watson. I am not so sure that I was aware that Mr. Brookreson requested a written confirmation. Ron Bicsak handled the phone calls. He is the chemist that was working on this, and was given the direction to make all the phone calls. I do believe, though, that he did tell me that Mr. Brookreson requested written confirmation and, knowing Mr. Brookreson, I am sure that is true.

Senator Melcher. Well, let's see, were you there on June 24 for a meeting?

Dr. Watson. No, I was not.

Senator Melcher. Were you, Mr. Miller?

Mr. Miller. Yes, I was.

Senator Melcher. As I understand, from Mr. Brookreson's testimony, that was discussed, this question—precisely this question.

Mr. Miller. The question was discussed on June 3. My recollection of that meeting on June 3 and notes from other people indicate that we had indicated we were going to try to adjust and maintain the system values as close to the Kjeldahl values as possible. We indicated to the Quality Control Branch to take whatever actions were necessary to do that.

Subsequently they orally asked those service points with NIR's biased below the baseline values to adjust their bias upward to move as close to the Kjeldahl values as possible. A similar discussion took place again in Portland on June 24, which included the background and rationale for that decision.

At that point—and it is my recollection that we had a discussion about whether a written instruction was necessary. I said that, in my opinion, based on the recommendations from the Division Directors and others, we should make the bias adjustment, as the Agency has done in the past, without a written confirmation.

I want to point out, and it is important for the record at this point, that we were looking forward to, within as early as 6 weeks, the prospect of putting a new calibration into effect. We did not know what impact it may or may not have on the baseline values within the system at that point. We were trying to be as accurate as we could be, and minimize disruption in the trade.

Senator **Melcher**. Well, when Mr. Brookreson said that he wasn't going to implement it because he didn't have written instructions, what does that do to FGIS? What did it do to you? I mean how did you react to that?

Mr. **Miller**. I left that afternoon for the Orient, to go promote wheat sales, and I wasn't sure what happened after that meeting. I was under the impression that Mr. Brookreson had made the change. I wasn't in direct contact on a day-to-day basis with the monitoring of the program, but I was under the impression that he was going to make a change.

Senator **Melcher**. Oh, that he was?

Mr. **Miller**. Yes.

Senator **Melcher**. After this June 24 meeting?

Mr. **Miller**. Yes.

Senator **Melcher**. You are approached on June 24 saying, "This is highly irregular. I am not even going to implement this," or "I haven't implemented it." Maybe you had the impression that he was going to later on, but he told you he hadn't implemented it because there wasn't a written confirmation. Why didn't you just say, "Well, I stand by what I've done. If written confirmation is needed, you've requested it, I'll give you one." Why not?

Mr. **Miller**. It was probably a poor management decision at that point. We probably should have just gone ahead at that point and issued a written confirmation, and it would have eliminated any confusion.

We didn't think it was necessary because we thought the instruction was clear and that there was not any reason for anyone not to understand the instruction. Again, I had been told this was the practice, and that this was not a new or unusual event, that has been portrayed here in this hearing.

Senator **Melcher**. Now, you were told by somebody who had quite a bit of experience in the State of Washington, as the head of the Grain Commodity Service, that without written confirmation he hadn't implemented it, and he had requested written confirmation and been denied, and your answer to that is that you just thought the problem would go away?

Mr. **Miller**. No, I didn't think the problem would go away. I thought that he would go ahead and follow the oral instruction, as had many other places.

It is important to point out that when the sites were identified where they were running lower than the Kjeldahl, calls were made to those people. They had a chance to make adjustments to their instruments at that point and bring them back in line with the rest of the system. The fact that Mr. Brookreson had not done that troubles us, but, at the same time, we expected he was going to do that very shortly.

Senator **Melcher**. Dr. Watson, on April 15, there was an instruction, given in the usual way, for a reduction, of the 0.2 percent. On May 1, the Montana witnesses have testified that on the basis of a 12 percent moisture basis, that was, in effect, there was a reduction of 0.3 of a percent. Do you agree with that or not?

Dr. **Watson**. No, I do not.

Senator **Melcher**. Why don't you?

Dr. **Watson**. Because on May 4, we established a new baseline that was unrelated to the baseline that was previously used. In other words, you are looking at a different set of samples and must divorce yourself from the previous set of samples that you were using. We were using an entirely new set of samples with an entirely new baseline that we had established at 13.89.

In regard to the 12 percent moisture basis, this does not affect the amount of protein in the sample as a whole; however, it does affect the protein percent per se. In other words, you approach everything on a constant moisture basis, and it increases the marketability of your system.

Senator **Melcher**. I understand that.

Dr. **Watson**. But it does not increase or decrease the amount of protein you have.

Senator **Melcher**. But on the question of whether or not the actual grain might be, say, 10 percent moisture, isn't their point well made when they say that the effect of having to have 12 percent moisture content is a reduction of minus 0.3 percent?

Dr. **Watson**. The way the grain is marketed now, yes, it would be.

Senator **Melcher**. Well, maybe I shouldn't draw any conclusions here—I want to understand it—but is their response that the FGIS must respond to the way the grain is marketed, or does FGIS set the basis for moisture content versus protein?

Dr. **Watson**. We only set the way we run the analysis, the way the technical aspect is carried out. We do not enter into the marketing of the grain.

Senator **Melcher**. Just so I thoroughly understand this, Dr. Watson, did putting a 12 percent moisture content give an advantage or disadvantage to Montana Hard Red Spring Wheat producers?

Dr. **Watson**. I don't know if I can make a general answer to that question. To those farmers that had below, or harvested their grain below 12 percent moisture, it would be a disadvantage. To those that were above 12 percent, it would be an advantage.

Senator **Melcher**. Yes, I understand. But their point, then, using that 10 percent example, is indeed correct?

Dr. **Watson**. Yes.

Senator **Melcher**. If that were the case?

Dr. **Watson**. If that be the case; correct.

Senator **Melcher**. All right. Then they could have lost some money?

Dr. **Watson**. What is that?

Senator **Melcher**. Then those producers could have lost some money as a result of all this?

Dr. **Watson**. It is conceivable, yes.

Mr. MILLER. Senator Melcher, I would like to respond to that question.

Senator MELCHER. Is it likely rather than conceivable if, indeed, their moisture content, is lower?

Dr. WATSON. I suppose, yes.

Senator MELCHER. Yes. And beyond that, then, this question of the 0.2 and 0.2 reduction is to correct something that was inaccurate in the past?

Dr. WATSON. In reference to the baseline for the new reference samples issued on May 4 that was established at 13.69; yes, that was incorrect.

Senator MELCHER. So this is all to make up for something that was inaccurate in the past?

Dr. WATSON. I don't know how you are relating the 10 percent moisture——

Senator MELCHER. No, I am not talking about that now. Each of those 0.2 reductions on the April 15 and May 4, were to make up for an inaccuracy of the past?

Dr. WATSON. Again, I would like to clarify that there was not 0.2 plus 0.2, did not equal 0.4. There was 0.2 for one set of reference samples reduction, and then there was 0.2 for another set of reference samples, but don't add the two together to come up with 0.4. It is a total of only 0.2 in our whole system.

Senator MELCHER. All right. I am not sure I can accept that myself. I'm not questioning your ability, Doctor; I'm questioning the semantics of all this.

Mr. MILLER. Senator Melcher, I would like to respond to that. At the time that occurred, I raised questions about that myself because I wasn't convinced that that was the appropriate response. I had asked our Field Management Division to undertake a survey of all the field offices under our responsibility to determine what the impact of these changes were. We have not been able to confirm, in any of our locations, that there was a doubling up of the 0.2 bias adjustment.

We did a specific survey. We have turned those surveys over to the Inspector General. We believe that, in the course of their investigation of this matter that the issue will be resolved. I certainly was led to believe that there was not a doubling up at that time, based on the information that was provided to me as a result of that survey. Again, I raised the question at that time, "Was this, in fact, a doubling up of the 0.2 bias adjustment?" I was assured that it was not. I still believe that, based on the information I have seen.

Mr. MARLENEE. Mr. Miller, not to be smart alecky or to put you in a bad light, but were you not gone and on vacation on May 4 when this decision to lower a second 0.2 was made and a communication issued?

Mr. MILLER. No, I was not on vacation. I was at a meeting in Topeka, Kansas, with the FGIS field office managers and the American Association of Grain Inspection and Weighing Agencies.

Mr. MARLENEE. So you were not gone on May 4?

Mr. MILLER. I was with the field office managers and with all of the State and private inspection agency managers.

Mr. MARLENEE. All right. If I may continue, Senator?

Mr. Miller. Again, I want to say that I don't want to leave the statement unchallenged, though, that there was a second 0.2 bias adjustment that occurred on May 4 that caused a lowering of the system by 0.4. I think that is a very fundamental consideration in this discussion that needs to be resolved.

Mr. Marlenee. All right.

Dr. Watson, it has been alleged that you felt the order of May 4 to lower the baseline 0.2 of a percent was partially or at least completely, or at least partially incorrect, and that you communicated this within FGIS, urging corrective action, and also to Al Williams in Montana and Mr. Brown in Portland, and to others. Is that correct?

Dr. Watson. I felt the 0.2 percent lowering of our new reference samples was, indeed, incorrect, and I think I expressed this view to my Division Director; I am not sure.

Mr. Marlenee. Yes. Well, now, and I want to get some information from the staff here, it is my understanding that Montana—that on April 15 the reduction was taken in Montana by 0.2 of a percent, and that after April 15, adjustment in Montana was carried out; comparison and confirmation tests on the new national reference samples were taken, and the results were sent to Kansas City, and—I think we have evidence—that they were told that this was OK and to implement the new standards on the 4th of May.

All right. You got the new national standards, and they are out there. Montana got them and they retested everything and recalibrated their machines, took new tests and sent them on, sent them back for confirmation; at which point you confirmed that. Then on May 4, Montana and others were instructed to lower another 0.2 of a percent.

Now, if that isn't—Mr. Miller, if that isn't a double lowering by 0.2 of a percent, then what the hell is? I'm flunking grade school arithmetic.

Mr. Miller. Well, I'm not aware of that. You will have to ask Dr. Watson to explain it.

Dr. Watson. Can I try and explain it again, using the flip chart for you, because I think it is a very fundamental question, as Mr. Miller has pointed out here. Is it OK if I go over and use that?

Mr. Marlenee. Well, you said you thought it was incorrect.

Dr. Watson. No. I did say I thought it was incorrect to lower the new reference samples by 0.2 percent protein.

Mr. Marlenee. That's right.

Dr. Watson. But it's not a doubling up and lowering a total of 0.4 percent.

Mr. Marlenee. Well, no, because you have already taken 0.2 of a percent of——

Dr. Watson. No. No. We had taken 0.2 percent off in another set of reference samples. Now, when you're going to another set of reference samples, forget about the old ones and consider only the new ones. You're going to a new baseline against the Kjeldahl, and that baseline is 0.2 below the Kjeldahl. So it is not 0.4 below the Kjeldahl; it is only 0.2 below the Kjeldahl.

Mr. Marlenee. Well, isn't the test that you conducted for Montana, a comparison between April and May 4, a comparison between old and new?

Dr. **Watson**. Yes, and those——

Mr. **Marlenee**. Yes.

Dr. **Watson** [continuing]. Agreed with each other. If you recall, they agreed with each other. Now, there is always some discrepancy between reference samples, and we know these discrepancies exist, and it could be 0.1 or 0.15, or 0.2 percent protein. However, I will stand by the record, that if you have a set of reference samples biased to the Kjeldahl and you lower it 0.2 percent, and then you have another set of reference samples that is 0.2 below the Kjeldahl, and you use this other set, it is still just 0.2 below the Kjeldahl; it's not 0.4, because you are going back to the same Kjeldahl baseline again. You are always referring back to the Kjeldahl as a baseline.

Mr. **Marlenee**. You have said that the result of all this miss-mash was a lowering, and perhaps an incorrect lowering.

I am going to switch to Kirk Miller at this time. You became aware that there might be some problem associated with the May 4 order to lower the protein readings, and the subsequent order raising the readings on June 15. Now, that problem was brought to your attention. My record can be confirmed, it shows that you knew by at least June 24, 1987, at which time there was a meeting in Portland, Oregon.

Mr. **Miller**. I would like to explain that chronology of events. Again, as I indicated before, when the events took place on May 4, I was at the meeting in Topeka, Kansas, with all the field office managers and with the American Association of Grain Inspection and Weighing Agencies, the private agency managers, that there had been this call made to confirm whether or not the bias adjustment that took place on April 15 had been transferred to the new standard reference samples.

I thought to myself, "There could be the possibility that this would be viewed as a doubling up of the 0.2 percent bias." I asked the Field Management Division, on May 19, to do a survey of the field to find out, in fact, what had happened. Those survey results are available.

Based on the survey results, we were able to confirm that there had not been a doubling up of the 0.2 percent change. At the same time, we did confirm—as we had indicated in a news release on April 15—that, as a result of adopting new uniform operating procedures prescribed in a new Protein Handbook which was issued and went into effect on May 1, that there would be some locations that would be overcorrected for the difference between the Kjeldahl and the NIR as indicated in the original studies.

Mr. **Marlenee**. I agree. You had overcorrected, and you felt that it would be overcorrected, and you were uncomfortable with what had happened, from our discussion here. You felt that there might have been a doubling up, and you were uncomfortable with the process.

We have heard numerous testimony here, from the group of people in the field, that they were uncomfortable. And yet, you did not seek to alleviate the question of the problem by giving written confirmation of, "Raise it 0.2 of 1 percent," and I find that a mistake in management and an abrogation of duty, at the worst. Clear communication is absolutely necessary when we're dealing with millions of dollars for our producers.

Now, on or about the 15th or 24th of June, you were personally aware that labs in Washington were operating at a 0.1 of a percent. You had told them—suggested to them, if you will—at the very least, suggested to them that they raise this by 0.1 of a percent, and they did not do that. It took until July 29 before that correction was made.

Let me ask you this very significant question at this point. Do you have, as the Director, the power vested in you to go out there, either with written communication or a verbal order, ordering those people to raise the calibration on the machine?

Mr. MILLER. I believe I do.

Mr. MARLENEE. Mr. Chairman, I am going to rest at that point.

Senator MELCHER. Part of the unanswered points, Mr. Miller, concern this communication from Dr. Watson or others in FGIS that there was an error made in lowering the Hard Red Spring wheat protein baseline values on May 4 from 13.89 to 13.69.

Dr. Watson, for instance, told Mr. Williams of Montana that there had been an error on lowering the Hard Red Spring protein baseline values. I think you just stated that you didn't agree with that. Did you, Dr. Watson?

Dr. WATSON. No, I did not.

Senator MELCHER. And since you didn't agree to it, why was it done?

Dr. WATSON. It was an administrative decision.

Senator MELCHER. Who made the decision, Mr. Miller?

Mr. MILLER. I don't recall that I made that decision. I wasn't consulted about it. I was surprised when it had been made, to be truthful about it.

Senator MELCHER. You were not consulted?

Mr. MILLER. I was not.

Senator MELCHER. And so in communicating your disagreement with it, Dr. Watson, Al Williams interpreted you correctly. There was an error, in other words?

Dr. WATSON. You can say—yes, it was an error, as far as I am concerned. That is my opinion.

Mr. MILLER. Senator Melcher, may I interrupt at that point for a comment?

Senator MELCHER. Yes.

Mr. MILLER. I think that a very fundamental point needs to be made here. I think there has been some disagreement within the management of FGIS between Dr. Watson and other senior managers in FGIS about the change that took place at that time, relative to where the reference values for the NIR should be set versus the Kjeldahl.

Again, the data resulting from Dr. Shuey's study earlier in the spring, indicated that the system was overreporting proteins on the NIR instruments. It was thought at that time that there was a slope problem which was a result of an improper calibration that causes the instruments to determine protein erroneously.

Dr. Shuey and others in the senior management had agreed and recommended to me that we make the 0.2 percent adjustment on April 15. On May 4, we were still using the same calibration equations that were thought to be flawed back on April 15. At that point, it was felt by most of the senior management in the Agency that in order to continue to use that flawed calibration that you had to transfer that 0.2 adjustment over to the new reference samples.

Dr. Watson did not agree with that. He has been in charge of the Kjeldahl operation and has defended it steadfastly down through the years, although even when you compare the results of the FGIS Kjeldahl operation with other outside laboratories, our operation has trended higher than almost every other major collaborative check that we have been involved with, except for the Japanese Food Agency.

I think that it is important to have it on the record that there was a disagreement among senior management in FGIS about the appropriate response to deal with the problem until a new calibration was developed.

I would also like to clarify a response to Mr. Marlenee's last question to me about whether I have it in my power to change the calibration. I misspoke when I said that I believe that I do, because I don't have it in my power to change the calibration. I could direct the bias adjustment. The calibration is a mathematical equation that is developed as a result of looking at sample data and comparing results between the NIR and the Kjeldahl. That can only be done by a statistician——

Mr. **Marlenee**. By a what?

Mr. **Miller**. By a statistician that would develop the new calibration equation. I cannot change the calibration, but I could change the bias adjustment.

Mr. **Marlenee**. But you can issue the order to change both of them.

Mr. **Miller**. Yes. To cause them to happen.

Mr. **Marlenee**. Yes. And you knew that the problem existed in the State of Washington and, yet, no order was issued.

Mr. **Miller**. Again, sir, it's a differentiation between a bias change and a calibration change. The last calibration change that was made in the system was made in 1982. We have a new calibration equation ready to put into effect, but we have not done that. We have made bias adjustments to the system.

Mr. **Marlenee**. If I may, another question, what would prompt, and what prompted a change in the recalibration, the reevaluation of equipment, the reevaluation of the national standards test, samples?

Mr. **Miller**. Well, again, the fact that the system had been using regional reference samples for a good number of years.

Mr. **Marlenee**. Was it the fact that there was a number of complaints from foreign buyers?

Mr. **Miller**. That precipitated the investigation of the entire program.

Mr. **Marlenee**. Yes. All right. Tell me—and I was going to ask this question of Mr. Rogers from United Grain. Mr. Rogers stated that if there was, in fact, a question of the level of protein, that an appeal could be made to the Federal lab in Olympia, and then it could be made to Kansas City, Missouri, if they were not satisfied with that.

Now, at the back of Mr. Rogers' statement, he lists a number of tests that had been made, the vessel, the ship date, loaded protein and landed protein. A difference exists there—for instance on the last entry, on the upper group of data, 14.50 protein to 13.50 protein on the landed protein.[1]

What option and what kind of checks are we doing on the landed protein? Who does the checks on the landed protein?

Mr. MILLER. FGIS does not get involved in doing destination grading.

Mr. MARLENEE. Well, who does?

Mr. MILLER. Usually it is independent laboratories.

Mr. MARLENEE. Who?

Mr. MILLER. Independent laboratories. Someone such as Doty Laboratories—Caleb Brett, or SGS. There are others that would provide destination grades for foreign customers.

Mr. MARLENEE. Does anybody do any checking on it?

Mr. MILLER. Yes, we did. This is the reason we got involved in the monitoring study that was initiated last December. This was soon after I came onboard as the Administrator. We asked Dr. Bill Shuey, who is the Technical Adviser for the Administrator, to participate with U.S. Wheat Associates in performing some comparison evaluations in the Pacific Northwest of Hard Red Spring wheat shipments going to the Far East. Dr. Shuey was involved in a study on four ships going to the Far East. Some of those ships were included in the data which Mr. Rogers provided to you, I believe.

Mr. MARLENEE. Well, it would seem to me that I, as the producer, and as a representative of producers, would want to be damn certain that just because some foreign buyer was complaining about protein samples that were below the samples that we had tested twice, and maybe three times in this country, or maybe even four times, by the time they were appealed, that we just didn't arbitrarily topple over, do handsprings, and lower the bias or lower the calibration on our machines.

Now, every time I go into an automobile store or a used car lot, I kick the tires and try the shocks, and I say, "It isn't worth a damn." You are going to have some of that with trying to make foreign sales, and I think we have had it.

Mr. MILLER. I appreciate your comment. I would like to ask Dr. Shuey if he would review for us some of the scope of his study, because it did involve much more than just relying upon destination grades provided——

Mr. MARLENEE. I want a fail-safe system—and I'm not just going to turn it over to United Grain—but I want a system where our producers are protected if there is a discrepancy in the protein when it lands at a foreign destination, and I don't want some willy-nilly outfit doing the protein test, without any check on our part.

Mr. MILLER. I appreciate your comments.

Mr. MARLENEE. But I'm not sure that exists.

Mr. MILLER. Well, we do have a system inside of FGIS to provide for international monitoring. Dr. Shuey serves as the chief of that group, and the samples——

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[1] See p. 208 for referred to material.

Mr. **Marlenee**. But at the outset, you said you don't get involved in that.

Mr. **Miller**. This group is involved in a special study. We don't monitor, as a routine matter, every shipment of wheat exported from the United States. We do not provide destination grades for wheat shipments. In other words, if an importing country wanted us to inspect a vessel of any grain, we would not dispatch a team of inspectors to the country to provide destination grades.

But we have, on occasions, set up studies to measure and compare the protein content of wheat, in our own laboratory in Kansas City, at the export elevator, on not only NIR instruments, but also on the FGIS Agricultural Research Service, and other outside laboratorys' Kjeldahl units. This has been done occasionally.

Mr. **Marlenee**. I apologize for taking so long.

Senator **Melcher**. Mr. Miller, you referred to Dr. Shuey making some comments on this point. I would prefer to have that in written comments, and I would like to insert it right here in the record at this point, because I think it would be helpful.

[The material referred to follows:]

March 3, 1987

TO : W. Kirk Miller
Administrator

FROM : William C. Shuey, Chief
International Monitoring Staff

SUBJECT: Trip Report - Southeast Asia, Singapore, Malaysia, Thailand, and Indonesia, January 21 through February 25, 1987

Purpose:

At the request of the U.S. Wheat Associates, the trip was planned to monitor three vessels (M/V GERILIA, M/V NASBON, and M/V SANKO HARVEST), destined to ports in Southeast Asia. Prior to the trip, special origin subsamples were taken during loading of the vessels for monitoring upon their arrival at destination ports. The purpose of the monitoring study was to determine the cause, if possible, for the protein discrepancies of 0.3 to 0.8 percent between origin and destination results.

Itinerary:

January 21 through 25: Washington, DC to Singapore
January 26 : Singapore to Kuantan, Malaysia
January 27 : Kuantan to Singapore
February 2 : Singapore to Johor Bahru, Malaysia
February 3 : Jahor Bahru to Singapore
February 4 : Singapore to Kuala Lumpur, Malaysia
February 5 : Kuala Lumpur to Petaling Jaya to Port Klang, Malaysia

February 6 : Petaling Jaya to Port Klang to Kuala Lumpur to Singapore
February 8 : Singapore to Bangkok, Thailand
February 10: Bangkok to Jakarta, Indonesia
February 11: Jakarta to Singapore
February 13: Singapore to Kuala Lumpur, to Lumut, Malaysia
February 15: Lamut to Ipoh, Malaysia, to Singapore
February 18: Singapore to Labuan, Malaysia
February 19: Labuan to Singapore
February 25: Singapore to Washington, DC

Summary:

Eight mill laboratories were visited. Their unloading, sampling, and laboratory procedures were observed and, where possible, docking of the vessel and opening of the hatches. Some results were obtained on both the origin subsamples and destination samples. Results on these samples within a laboratory were consistent and averaged less than an 0.1 percent difference between origin and destination samples; however, these results were 0.3 to 0.8 percent below the certificated value. Results between two mill laboratories of the same company averaged essentially the same, showing an 0.001 percent difference.

Five of the laboratories participated in an American Association of Cereal Chemists (AACC) Check Sample Service and are within standard deviation of the mean of the collaboratives. The most recent results are shown in Appendix A. The data, to date, from the laboratories was consistent with the data obtained from an Agricultural Research Service (ARS) laboratory, which also shows less protein content than was certificated. Kjeldahl digestion/distillation and Keltec equipment are used for determining the protein in the destination laboratories. Sulfuric acid, hydrochloric acid, and boric acid are used in the

Summary: (continued)

distillation receiving flask and a variety of indicators. Full details of the procedures, etc., will be in the final data analysis report when all the samples have been analyzed by the different laboratories involved in the study.

A total of 9 mills in Southeast Asia and 4 vessels were involved in the study: M/V's ARTEMIS ISLAND, GERILIA, NASBON, and SANKO HARVEST, and the mills are: Kuantan Flour, Sabah Flour, Johor Bahru Flour, Federal Flour, Malayan Flour, Khong Guan Flour, Thailand Flour, Laemthong Flour, and United Malayan Flour. Three other flour mills were also visited but did not participate in the study. These mills also reported receiving low protein: Prima Flour, Bogasari Flour, and United Flour.

Conclusions and Recommendations:

The data on origin and destination samples are consistent. It would appear that because of the slow unloading rate, sampling at destination is not a factor in the protein discrepancy. Because of the good agreement with the AACC check sample means for the five laboratories and the ARS laboratory results, it would appear the certificated protein was in error. Additional data will need to be collected to verify if an error was made and the magnitude of the error. Experiments will need to be conducted to determine the sources of error in FGIS and the buyers' laboratory which causes the lower protein results than certificated and the range in differences.

I recommend the following areas of research and follow-up to be considered.

1. Determine if wheat samples, which do not fit the norm, should be disregarded.

Conclusions and Recommendations: (continued)

2. Determine particle size distribution and packing factor characteristics of wheat samples giving normal and abnormal results.

3. Determine the compatibility and non-compatibility of wheat blends from different areas and crop years and/or their effects on the relation of near-infrared reflectance (NIR) and Kjeldahl values.

4. Determine the effect of wheat storage time, if any, on NIR results.

5. Determine if all makes of NIR's respond the same to "odd-ball" wheats or blends.

6. Determine if certain foreign materials in a wheat sample would alter the comparative value of the NIR and Kjeldahl results.

7. Determine if strategically placed Keltec units could be used to detect "odd-ball" results and wheats or wheat blends and help also ease the workload of the Quality Control and Testing Branch (QCTB) unit.

8. Develop a quality control statistical procedure to ensure the integrity and accuracy of the protein program. (If this were found to be impossible with the wide variety of potential wheat lots with the present equipment - abandon the program.)

9. Determine the feed rate and kernel size effect on ground sample and NIR results.

10. Determine types of damage and percentage on NIR results.

Recommendations: (continued)

11. Develop a mandatory national collaborative inspection sample program for all inspection points.

12. Develop a direct line between the master Kjeldahl unit at Kansas City and all inspection points.

13. Selectively monitor shipments on a subsample basis.

14. Monitor origin and movement of grain in the interior to detect "odd-ball" lots.

Detailed Report

SINGAPORE

Monday, January 26 (Morning)

Met with Messrs. Tim Oviatt, Regional Director, South Asia and Peter Kee, Technician, U.S. Wheat Associates. We discussed tentative plans for my visit. I explained plans for exchange of samples and the intent of the subsamples. Mr. Oviatt informed me we were going to the Kuantan Flour Mills (KFM), Kuantan, Malaysia, to observe the operation of their laboratory and unloading of the M/V ARTEMIS ISLAND. Three subsamples were selected from the M/V GERILIA which ranged from 13.17 to 14.05 percent protein on the "as is" moisture basis, according to Dr. Gordon Rubenthaler, Research Scientist, USDA, ARS, Western Wheat Quality Laboratory, for testing in the Kuantan Flour Mills Quality Control Laboratory.

January 26: (continued)

We flew to Kuantan in the afternoon and were met at the airport by Mr. Shaharuddin Shamsuddin, General Manager/Director, who took us to our hotel.

Tuesday, January 27

In the morning, we met with Messrs. Andrew Tan Chin Nam, Managing Director; Shaharuddin Shamsuddin; Loke Kin Choy, Shipping/Material Executive; Soo Seang Chai, Head Miller; and Hoe Yit Nee, Product Development Manager. We discussed the layout of the facilities, their future plans, toured the premises, and discussed the purpose of our visit and program for the day, after which we went dockside to observe the opening of the hold containing the Dark Northern Spring (DNS) wheat they were to receive. (Details of the facilities are in Mr. Oviatt's trip report dated September 11-12, 1986, Appendix B.)

There was separation in the hold, and the Western White wheat had been taken off the vessel in Hong Kong. The plastic separation was intact, but essentially all the plywood had been removed. There was a small amount of White wheat around the edges. The first sample from the vessel was taken about 10 feet from the edge of the hold in one spot. Approximately hourly samples were taken during the dumping of the truck by grabbing a sample as the grain flowed from the tailgate. A more representative sample would be to take one of each truck and blend those collected over an hour period. The number of trucks dumped per hour was dependent upon the rate the clamshell could operate.

We observed the Kjeldahl equipment and procedure, a copy of which is on record in the International Monitoring files. They had modified several

January 27: (continued)

pieces of equipment, which will have to be investigated further to determine the effect on the protein results, if any. Although the average protein results on the three submitted samples found by the KFM and ARS Laboratories were 13.77 and 13.56 percent, respectively, they were not of the same order of magnitude. Also, the KFM results only ranged from 13.71 to 13.83, which is much less than 0.88 percent for which the samples were selected. Additional exchange of samples will have to be made to resolve the differences.

Portions of each sample taken at destination have been obtained for FGIS analysis.

The mill presently obtains a straight-grade flour at a rate of 76 to 78 percent with a 0.50 flour ash content. Their mill has 5 breaks, no purifiers, and all reduction rolls except the final reduction are smooth. They temper to 14.3 percent moisture content for 25 hours and add an additional 0.5 percent 15 minutes before first break. They would like to increase their extraction rate to 80 percent and storage by 20,000 metric tons. Also, the new storage facilities will be silos, which they believe will be 4 steel bins with a capacity of 5,000 mt per bin; 20 meters in diameter. Normally, the relative humidity is 60 percent, the temperature ranges from 26°C to 30°C, and 4 months out of the year (October to February) is the rainy or monsoon season. They believe the average turn around time would be between 3 to 4 months.

We returned to Singapore in the evening.

Wednesday/Thursday, January 28/29

The subsamples shipped to Singapore were divided from the M/V GERILIA, and composite sublots and

January 28/29: (continued)

hold composites were made up to take to the Johor Bahru Flour Mill (JBFM), Johor Bahru, Malaysia, and the Federal Flour Mill (FFM), Port Klang, Malaysia, for analysis.

Monday, February 2 (Morning)

Met with Mr. Peter Kurz, Agricultural Trade Officer, U.S. Agriculture Trade Office. We discussed the purpose of my visit and the tentative plans. He expressed a desire to accompany us on one of the port visits. If he could not join us, at least his assistant, Mr. Bernard Kong, would.

Mr. Kurz expressed the deep concern of everyone over the consistently low protein wheat arriving in Southeast Asia and the loss of the market. It is obvious that not price, but continual minimal and lower protein than certificated, is the cause for the declining market.

MALAYSIA

Monday, February 2 (Afternoon)

After my visit with Mr. Kurz, I motored to Johor Bahru to meet the M/V GERILIA which was to dock at 10:30 am with DNS wheat for the JBFM. I was met at the hotel by Mr. Yap Wee Hong, Quality Controller, JBFM, who took me to the mill where I met Miss Alice Wong, Chemist, Federal Flour Mills (FFM), (Kuala Lampur), and Messrs. Tan Hock Yong, Plant Manager, and Iskander, Senior Laboratory Technician. We visited briefly about plans for the next two days, and I gave them the subsamples taken during loading of the vessel in the U.S. We then proceeded to the elevator to

February 2: (continued)

observe how samples were taken, either from the belt or transfer spout.

The point of taking samples was dependent upon the grain flow rate. Before going to dockside, we stopped at the SGS (Malaysia) Sdn. Bhd. Office, where I met Mr. Chong Kuek Phin, Branch Manager. I explained our method of sampling and received a copy of their sampling instructions (Appendix C). We made arrangements for them to obtain samples from each hold by the regular procedure for forwarding to me through the Agricultural Counselor in Kuala Lumpur.

Four Buhler vacuvators are used to discharge the grain (two suckers in each hold) at a rate of 100 tons per hour. Two units discharge onto short conveyor belts, approximately 20 feet long which, in turn, discharge into the boots of the elevator leg that transfer the grain onto a long conveyor belt (approximately 1/4 mile long) to the elevator. The other two units discharged into a drag conveyor buried in the dock that delivers the grain to the elevator boot.

Hold #1 samples were grabbed from the belt every 500 tons by SGS and from the discharge spout of the vacuvators for hold #3. The mill samples were taken in the elevator every 1 to 1-1/2 hours from the belt. The grain was approximately 18 inches across on the belt and 3 to 6 inches deep in the center. Grab samples appeared to be representative, and there was very little apparent segregation at point of sampling. The bend in the spouting of the vacuvators appeared to be too sharp and could cause some breakage.

We returned to the laboratory and discussed in detail the Kjeldahl procedure and their method in particular. This mill is operated by the FFM in

February 2: (continued)

Kuala Lumpur where the corporate quality control policies are established. Their procedural mechanics were okay, and their results were consistently 0.7 to 0.9 percent lower than what was certified and approximately the same as the values reported by the ARS Laboratory. A detailed report will be issued on the data once it has been obtained, collected, tabulated, and analyzed.

Tuesday, February 3

We viewed the equipment and noted differences between units used by FGIS and JBFM. We observed further unloading of the vessel, and compared data obtained to date which was consistent with data obtained the previous day. We met with Mr. Chan Chong Wen, General Manager, JBFM and discussed our observations and findings thus far. He was pleased we were conducting the monitoring program and offered full cooperation. We expressed our appreciation and explained this was an indepth study involving several vessels and mills.

SINGAPORE

Wednesday, February 4 (Morning):

We assembled the data collected and reviewed our observations. We prepared 4 samples for Dr. Rachman, Group Corporate Planner, Research and Development, Prima Flour Mills.

We visited with Dr. Rachman about our study. He thought it was a good plan and needed to be done. They no longer buy U.S. DNS wheat because of the low protein and inconsistency in the quality. They used only U.S. wheat, at one time, and would do it again if we would deliver what was

February 4: (continued)

certificated. They want the protein, not compensation. The other countries assure them of sufficient protein by giving a little extra (0.1 to 0.5 percent more than the contract specifies). The U.S. is always 0.1 to 0.3 percent below.

I then flew to Kuala Lumpur after visiting with Dr. Rachman.

PORT KLANG, MALAYSIA

Thursday, February 5

Mr. Lee Yee Sang, Baking Instructor, Federal Flour Mills, Berhad, drove Mr. Oviatt and me to Port Klang where the M/V GERILIA was to dock in 2 hours. We were met at the FFM Quality Control Laboratory by Messrs. Jimmy Chang Gee Sing, Quality Controller; Teh Lam Chuan, Assistant Quality Controller; Ang Hock Chai, Cargo Surveyor, SGS (Malaysia) Sdn. Bhd., and Ms. Alice Wong, Chemist, FFM, whom we had met earlier at the JBFM in Johor Bahru. We discussed plans for the following 2 days and some of their recent experiences.

Generally, they observed a 1.0 percent higher moisture in the wheat than was certificated and lower protein from 0.3 to 0.8 percent. Both the FFM and JBFM participated in the AACC Check Sample Service. An analysis of the 8 most recent samples which range in protein from 7.7 percent to 14.0 percent show the laboratories to be well within an acceptable tolerance of the collaborative mean and less than one standard deviation. The data indicate both laboratories' protein determinations reliable. Ms. Wong had brought 6 samples,

February 5: (continued)

analyzed at the JBFM Laboratory, to the FFM Laboratory for analysis. The differences in protein between the two laboratories ranged from -0.03 percent to 0.17 percent with an average 13.776 percent and 13.777 percent, respectively, on the same moisture basis. This data, like the AACC check samples, showed excellent agreement between the two laboratories.

We observed the vessel docking, opening the hatches, and inserting the vacuvators which had a capacity of 160 tons/hour. Two suckers were placed in hold #3 and 1 placed in hold #1. We observed the method of taking the grab samples from the belt approximately every 2 hours. We met with Mr. Tan Gee Sooi, Factory Manager, FFM, and reviewed our program.

After lunch and during the afternoon, we compared results of the three laboratories, JBFM, FFM, and ARS with the FGIS certificated protein for each sublot, except sublot #3 which had not been received before leaving on the trip. On the "as is" moisture basis, the results were 14.51, 13.76, 13.79, and 13.81 percent protein for the origin, ARS, JBFM, and FFM, respectively. The data showed a consistent difference of 0.7 percent between the origin certificated protein and the three laboratories which were within 0.05 percent of each other.

Friday, February 6

We visited the ship which had been discharging all night at a rate of approximately 160 tons per hour. The deck of the ship was covered with approximately one-half to one inch of chaff. At the transfer points from the belt to the elevator legs, there were corn "bees' wings", or fine screenings, approximately 1 foot thick for a

February 6: (continued)

diameter of 3 feet which tapered off to 2-to-3 inches thick over 60 percent of the dock. Condensation was observed on the suckers and water was dripping onto the wheat.

Upon returning to the laboratory, we discussed in detail the methodology and observed the actual determination of protein by their Kjeldahl procedure. There was nothing that appeared to be abnormal, which the AACC data would verify. They presented data to show that recent shipments of U.S. spring wheat were weaker than previous shipments. The farinograph showed a 3-minute shorter mixing time and a 7-minute shorter resistance to mixing which are highly significant. Ms. Wong and I discussed other chemical tests used in the quality control of flour.

SINGAPORE

Saturday, February 7

Mr. Oviatt and I reviewed the data and compared notes on what had been observed to date. We contacted those people in Thailand and Malaysia for final preparation of the visits for the coming week.

BANGKOK, THAILAND

Monday, February 9

Mr. Rufino A.S. Laguio, Assistant Plant Manager, United Flour Mill (UFM), escorted Mr. Oviatt and me to their Quality Control Laboratory and Food Centre. We met with Mrs. Emma B. Laguio, General

February 9: (continued)

Manager, Food Department; Ms. Onanong Naivikul, Chief Chemist; and Mr. Chartchai Chittaropas, Director, Thai Silo and Industry, and Thai Flour Mill Industry (TFMI). We had a general discussion about new changes in reporting protein on the 12 percent moisture basis, dockage in tenths of a percent, and explained the inspection loading log. They did not receive origin samples or the loading logs.

Two major concerns were:

1. Protein: they have to order 15 percent protein to assure themselves of a 14.5 percent protein, since they consistently receive approximately 0.5 percent less.

2. Live insects: it costs them approximately 20 cents per ton to fumigate the wheat as a safety measure to stop infestation for 3 to 4 months, their normal storage time for a lot of grain.

The moisture content is usually 1 percent higher at destination than at origin. A marine leg is used to remove the grain from the vessel. After a period of time, condensation is observed on the leg.

They take 5 samples during unloading of the vessel, if the lot is less than 2,000 tons; and 10 samples if the lot is 2,000 tons or more. Five probes are taken when the hold is initially opened. We further discussed a specific problem of small kernels for some shipments and large kernels for others and the lack of uniformity. They believe this also contributed to the discrepancies between destination and origin results. They participate in the AACC Check Sample Service. For the 4 recent check samples,

February 9: (continued)

the UFM averaged 12.495, while the mean of the collaborators was 12.490 on the same moisture basis. The proteins ranged from 11.1 to 14.0 percent.

Mr. Chittaropas drove us around the Thai Silo and Mill facilities, but we did not visit the laboratory since the mill was not running. Messrs. Keerati Kiatrabile, Executive Vice President, Laemthong Corporation, Ltd. (LCL); Viroj Rojanaumphai, Wheat Flour Department, LCL; Pong Prinyaroje, Plant Manager, Siam Trading Co., Ltd.; and Pracha Raksincharoensak, Executive Vice President/Senior Vice President, Metro Company Limited, joined us for further discussion. They also expressed concern over the constant lower protein values on the wheat received from the United States. This was not the case for Australian or Canadian wheats they had received. They informed us that TFMI was to receive the wheat from hold #3 and Laemthong the wheat from hold #5 of the M/V SANKO HARVEST. We made arrangements for them to send us a portion of their regular destination samples obtained during unloading of the vessel. Grab samples are taken from the belt every hour.

Tuesday, February 10

We visited the Laemthong Quality Control Laboratory and met with Ms. Sunee Sirskulchai, Chief Chemist, Head of Laboratory. They use the Keltec unit to determine protein and check the unit using ammonium oxalate. There would be some question on how they check with other laboratories. They use the Royal Australian Cereal Institute's (RACI) standard sample, but that only is sent out once a year and has a protein content of around 11 percent.

February 10: (continued)

We also met and discussed with Messrs. Kamon Punponsin, Vice President, LCL; and Monchai Srichaiyongphanich, Director, Chaiyong Group of Companies, the purpose of our visit and plans for exchanging samples from the M/V SANKO HARVEST.

JAKARTA, INDONESIA

Wednesday, February 11

Mr. Ali A. Basry, Marketing Consultant, U.S. Wheat Associates, Jakarta; Mr. Oviatt, and I visited the P.T. Bogasari Flour Mills (PTBFM) and met with Mr. Palmiro Baccinelli, Production Manager. Mr. Baccinelli stated that he was unhappy with the low protein results because they paid a premium for something they did not receive, but they did like the strength of the U.S. wheat. Canadian wheat is too high in moisture for properly conditioning; therefore, he does not like it. The Canadian Western Red Spring 12.5 percent protein varies too much in quality to be satisfactory. They had been using 30 percent Saudi wheat, 20 percent DNS, and 50 percent Argentine wheat in the baker's mix. Because of consistently low protein and price, they have used up the last of the U.S. wheat and will be using a mix containing 35 percent Saudi and 65 percent Argentine.

High falling number value is one problem they have with Saudi wheat, since they do not add malt supplement to control enzyme activity. They make three basic types of flour: high protein, 12 to 13 percent; medium protein, 10 to 11 percent; and low protein, 8.0 to 8.5 percent. Grab samples are taken every hour from the belt when transferring grain from elevator to mill. Ten grabs per sample are taken from the hold of the ship, usually at 3

February 11: (continued)

different levels. The proteins of the silo samples and the ship sample agree within an accepted tolerance of 0.2 percent. A Keltec is used to determine the protein, but the instrument is checked with the Kjeldahl.

After our visit with Mr. Baccinelli, we met with Mr. Robert M. McConnell, Agricultural Counselor, U.S. Embassy. We explained the purpose of the trip and what we had found to date. He thought it was very worthwhile and long overdue. We discussed, at some length, the P.L. 480 program for Indonesia, and the long delay in approving the monies. It causes a hardship on facilities with a stacking of shipments. Also, presently, the last of the U.S. wheat has been used up, and the prospect for more will probably be delayed until the P.L. 480 contract has been signed.

We then met with Mr. Piet Yap, Head Office, PTBFM. He was glad we were finally doing something. He had given a speech in Honolulu (January 1985) on the need to clean up the wheat and protein problems, but no one would listen. He said we need to change our inspection program or system. I explained some recent changes, proposed changes, and the Grain Quality Improvement Act passed by Congress. He felt this was a step in the right direction and emphasized Indonesia was using approximately one-half as much U.S. wheat as a few years ago.

SINGAPORE

Thursday, February 12

I prepared samples from M/V's NASBON, ARTEMIS ISLAND, SANKO HARVEST, and GERILIA for Malayan

ebruary 12: (continued)

Flour Mills (MFM), KFM, Labuan Flour Mill, TFMI, LCL, Khong Guan Flour Mill (KGFM), FFM, and JBFM, respectively. Made arrangements to meet with MFM representatives to observe unloading of M/V NASBON at Lumut, Malaysia.

LUMUT, MALAYSIA

iday, February 13

Flew to Kuala Lumpur, met with Mr. Wee Kok Teh, Deputy Managing Director, Malayan Flour Mills Berhad (MFM). We discussed the program and findings to date. We then drove to Lumut where the mill is located to observe docking of the M/V NASBON. We were met by Messrs. Yap Fan Yee, Deputy Mills Manager; and Hong Siew Nam, Chief Chemist.

After unloading has begun, samples are taken in the tower every half hour with a point sampler. The marine leg has a discharge capacity of 300 tons per hour. The sample represents every 150 tons. An initial sample is taken from the top of the hold by a series of grabs, 5 across by 9 times the length or 45 total grabs. I was told the U.S. DNS in hold #4 was under Canadian Hard Red Winter wheat, 10.5 percent protein.

They received a composite sample of DNS from the shipper and found 14.1 percent protein. They believe the protein will average 14.0 to 14.1 percent for the shipment, although they ordered 14.5 percent minimum protein. Mr. Weh Kok Teh also discussed problems with corn (Thai corn) storage even when moisture is around 14 percent. They grind the sample in a stationary-hammer hammer mill.

February 13: (continued)

Met with Mr. Stephen Foo Say Chew, Chemist, Dindings Soya and Multifeeds Sdn. Bhd. We discussed several analytical techniques and, in particular, their problems in the feed industry. It appears that corn with higher moisture, above 13.0 percent (Thai corn), can begin heating in the bins. This is especially true if the grain is 13.5 percent or more. Apparently, the Thai corn has a sufficient amount of microorganisms present to require very low moisture to impede respiration.

Saturday, February 14

We randomly selected 10 destination samples collected during the night and 10 origin samples to run proteins on the Keltec equipment. They normally run samples on the Keltec and check it against the regular Kjeldahl method. Five random origin subsamples and 6 random destination samples were selected of the first 20 samples run on the Keltec for Kjeldahl analysis. The average Kjeldahl protein was 0.043 percent higher than the Keltec. The origin subsamples averaged 14.134 percent, and the destination samples averaged 14.137 percent at the same protein level. This data, like that from the M/V GERILIA, shows excellent agreement between results on the origin and destination samples and was consistently lower than the FGIS certificated protein of 14.543 percent.

An Emerson kicker is used to dock the wheat before grinding. Chaff is blown off while pouring the sample in a scoop. A Retsch ZM-1 impact mill with an 0.5 mm round-hole sleeve sieve is used to grind the sample. Corn is ground in a Chris and Norris stationary-hammer hammer mill with a 2 mm round-hole sieve. The ground sample is mixed in a

February 14: (continued)

mixing bowl before transferring to a poly bag. The digestion temperature is 400 to 410°C. The pH of the endpoint needs to be checked.

Moisture condensation was also observed on the marine leg, and wheat was clinging to the side of the leg.

SINGAPORE

Monday, February 16

I compiled, tabulated, and calculated data collected the past week. Compared data with that received on origin subsamples run by ARS.

Tuesday, February 17

Prepared a short preliminary report for the Administrator (Appendix D). Contacted and discussed with various mills, data obtained to date. Made preparation for handling sample with United Malaysian Flour Mills, since I was unable to visit. Discussed in detail with Ms. Chew Seok Lay the plans for sending me regular samples from the lighter vessel. They had obtained an average of 13.89 percent protein on 13 origin subsamples; ARS' average results on the same set of samples was 13.75 percent on the same moisture basis.

LABUAN, MALAYSIA

Wednesday, February 18

Flew to Labuan to visit the Sabah Flour and Feed Mills (SFM) and met with Messrs. Palanivelu, S.K.,

February 18: (continued)

Factory Manager; Tay Theng Swee, General Manager; Yue Keng Seng, Engineering Manager, Gold Coin (Malaysia) Berhad; and Nordin B. Othman, Director of Agriculture, Federal Territory Sabah. We discussed the program for the following day and what had transpired to date during my visits to the various mills.

Thursday, February 19

Mr. Othman and I visited with Dr. Ahmad, Director of Health, Federal Territory Sabah. We discussed the new law on certifying the amount of pesticide residue, radiation, phytosanitary requirements in food products and raw materials imported by Malaysia; FGIS' method of sampling; the role of FDA; the role of the Animal and Plant Inspection Service (APHIS); and how the Malaysian Department of Health might comply with requirements in the new Malayan law. It was decided that Mr. Othman, who was educated in Texas, might obtain sublot samples of shipments arriving in Labuan and test them prior to arrival for clearance. They are to send me a copy of the new law.

After our visit with Dr. Ahmad, we went to the SFM where I met with Mr. Rotasius Mikil, Chief Chemist of the Flour Quality Control Laboratory. I gave him a portion of the 4 sublots which comprised their lot on the M/V ARTEMIS ISLAND, and discussed activities for the day. Mr. Willie Chong, Production Manager for Flour, then gave me a tour of the facilities.

They unload approximately 1,500 tons per day. Grab samples are taken every 15 minutes between the surge bin and weighing hopper. Usually, a day's collection is blended and run for analysis. Twenty-three samples were collected from the M/V ARTEMIS ISLAND over a period of two and one-half

February 19: (continued)

days. Samples 1 through 6 approximated sublot #4; 7 through 12, sublot #3; 13 through 18, sublot #2; and 19 through 23, sublot #1. The average protein results, on the 12.36 percent moisture basis, for the 4 origin sublots were 14.10 percent and for the 23 destination samples, 14.08 percent.

The protein is determined with a Keltec unit using hydrochloric acid in the receiving distillation flask with a methyl red indicator. The sample is digested at a temperature between 400 - 410°C for 45 to 60 minutes depending on the material (wheat for approximately 50 minutes). The sample is ground in a Burr grinder. They standardize the unit using standard solutions obtained from West Germany; however, they subscribe to the AACC Check Sample Service for feed. The mean AACC protein content for 6 recent collaboratives was 19.050 percent, and the SFM average protein on the same samples and moisture content was 19.010 percent. This is a second method they use to standardize the equipment. Their results were consistent for both the destination and origin samples and were 0.4 percent below the certificated value. They attributed the slightly higher moisture at destination to condensation on the vacuvator pipes.

SINGAPORE

Friday, February 20

Tabulating data and preparing report.

Sunday, February 22

Visited the Khong Guan Flour Milling Ltd. (KGFM) docks to observe arrival and unloading of barges from the M/V SANKO HARVEST. I was met by Messrs.

February 22: (continued)

Leong Thien Siong, Technical Executive and Lim Heng Jiong, Production Manager. The vessel is anchored approximately 2 hours by lighter from the dock. Each lighter carries about 200 tons of wheat. Two Ocrim suckers, with a combined capacity of 80 tons/hour, are used to empty the lighters. They could unload at a faster rate but the elevator drag conveyors and bucket elevators could not handle that amount of grain. The sample is taken from a specially built zig-zag pipe just prior to delivery onto the drag conveyor and elevator leg. One grab sample is taken to represent each lighter. They will take an extra 500 grams for the protein study besides their regular sample. They had observed the sucker pipes sweating after a period of time from the cool wheat from the lighters.

Monday, February 23

Met with Messrs. Robert Ang, Director/General Manager; Chia Chin Tee, Mills Manager; Choo Teck Woo, Chief Chemist; and Chew Choo Han, Managing Director, KGFM. I explained the material in the overview about FGIS, how we take samples, the inspection log, and the purpose of the monitoring study. Mr. Ang wanted to know if they bought 15.0 percent protein wheat, would they be sure to get 14.5 percent wheat? Mr. Chia told me they had to get some higher protein U.S. spring wheat from another mill in Southeast Asia because one shipment was 0.5 percent below what they ordered. The purchase was necessary to make up the protein difference and weaker flour characteristics of the lower protein wheat. They wanted to know who was to pay for the protein difference, when, and how. They really need the protein quantity they order more than the difference in price because of customer demand and their limited supply of wheat.

February 23: (continued)

Mr. Choo stated they had found a 14.1 percent protein content in the composite sample the shipper had sent them of the M/V SANKO HARVEST. They found 13.95 percent protein on the destination lighter I observed them run and 14.04 average protein on the 7 subsamples taken at origin. The ARS Laboratory found a 13.96 percent protein on the same series of origin subsamples, at the same moisture level. The data show consistent results in origin and destination samples.

The Khong Guan Laboratory also participates in the AACC Check Sample Service, and the 4 most recent results show an average of 12.365 percent for the KGFM Laboratory, compared to an average of 12.515 percent for the AACC mean of the collaborators, or a difference of 0.150 percent. Preliminary results would indicate the data report by the laboratory is within one standard deviation.

Appendices

Appendix A

cc: David Galliart
Roy Barrett
Dr. Kenneth A Gilles
U.S. Wheat Associates
Tim Oviatt, U.S. Wheat Associates (South Asia)
Peter O. Kurz, ATO (Singapore)
William H. Barkell, AG Counselor (Kuala Lumpur, Malaysia)
Weyland Beeghly, AG Counselor (Bangkok, Thailand)
Robert M. McConnell, AG Counselor (Jakarta, Indonesia)

FGIS-ADM:WCShuey:cr:3/3/87

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---------REGRESSION ANALYSIS------------------


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                S.E. ASIA PROTEIN AACC VS LAB

INDEX        NAME       MEAN         STD.DEV.
  1          NO.       14.464          8.235
  2          MEAN      12.723          5.419
DEP. VAR.:   LAB       12.658          5.278
-----------------------------------------------

DEPENDENT VARIABLE:  LAB

VAR.  REGRESSION COEFFICIENT
MEAN                   .973
CONSTANT               .274

STD. ERROR OF EST. = .203

         r SQUARED = .999
                 r = .999

STD. ERROR   T(DF=  26)   PROB.
7.2198E-03    134.811    .00000


           ANALYSIS OF VARIANCE TABLE

SOURCE         SUM OF SQUARES   D.F.
REGRESSION            751.152     1
RESIDUAL                1.075    26
TOTAL                 752.227    27


MEAN SQUARE      F. RATIO   PROB.
    751.152     18173.960  .000E+00
       .041
```

	OBSERVED	CALCULATED	RESIDUAL
1	8,018	8,187	-.169
2	7.873	7.976	-.103
3	7.718	7.761	-.043
4	8.021	7.991	.030
5	11.166	11.171	-5.093-03
6	13.956	13.720	.236
7	11.326	11.231	.095
8	13.828	13.587	.241
9	7.998	8.187	-.189
10	7.543	7.761	-.218
11	7.909	7.991	-.082
12	11.203	11.171	.032
13	11.151	11.231	-.080
14	13.828	13.587	.241
15	11.062	11.090	-.028
16	13.786	13.863	-.077
17	11.222	11.218	4.1884E-03
18	13.655	13.646	8.7887E-03
19	12.796	12.734	.062
20	13.313	12.719	.594
21	13.700	13.943	-.243
22	19.514	19.424	.090
23	20.344	20.069	.275
24	34.027	34.340	-.313
25	10.976	11.090	-.114
26	13.573	13.863	-.290
27	11.080	11.218	-.138
28	13.830	13.646	.184

US WHEAT
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FOREIGN MARKET DEVELOPMENT REPORT
KUANTAN FLOUR MILL, KUANTAN, MALAYSIA

Traveller : Timothy M Oviatt, Regional Director South Asia

Period : September 11 - September 12, 1986

Purpose : To review with the U.S. Agricultural Attache the Kuantan Flour Mill, Malaysia's new mill which begins operation in September 1986. The USW Regional Director and the Attache met with the mill's staff to discuss the mill's market requirements and prospects for flour sales in Malaysia.

Itinerary : September 11, 1986

Departed Singapore 1645 on MH 612
Arrived Kuala Lumpur 1735
Departed Kuala Lumpur 1900 on MH 364
Arrived Kuantan 1935

September 12, 1986

Departed Kuantan 1520 on MH 631
Arrived Singapore 1605

1. Specifications: a) 240mt wheat/24 hours; Buhler-Miag equipment, Kuantan, West Malaysia;

   b) 12,000mt grain storage capacity (flat godown) which is already obviously insufficient and is to be expanded to 20,000mt;

   c) Flour Storage: 3,500mt with bulk capability (15% of Malaysian market uses bulk);

   d) Offloading of wheat is by clams to trucks which transport the grain less than 1km to the godown;

   e) Has flour blending capability -- only Federal Flour Mill presently has this;

   f) Monsoon activity over 4 to 5 months annually is expected to hamper offloading;

   g) Employs about 60 persons, however some labor for packing and transporting flour is to be contracted.

2. Kuantan Flour Mill is Malaysia's only milling company uniquely and privately owned by a 51% Bumiputra interest and 49% Chinese interest. The total investments when paid up in total is about M$ 5.5 million dollars or approximately US$ 2.1 million.

3. Kuantan Flour Mill expects to reach full milling capacity in about three years in a market with an already surplus milling capacity. The other four flour mills in Peninsular Malaysia are not operating at more than 60 - 70% on the average. The question of how this new mill will survive or how the increased Peninsular Malaysian milling capacity will be accommodated by the steady but slow growth Malaysian flour market remains to be seen, however a review of the present licensing structure of the Malaysian milling industry as well as market trends suggest that there may be room for all to eventually survive with separate market shares earned competively.

4. The government of Malaysia regulates the milling capacity of each of the country's now six flour mills at 577,000mt of rated flour output annually. The Kuantan Flour Mill was licensed about three years_ago at 50,000mt annually, the first increase in this license capacity for the country since 1972. However it must be understood that only a portion of most of the flour mills' total licensed capacity is licensed for the domestic market. This is true particularly for the larger mills, for the balance is only to be used for any sort of possible export flour prospects (Thailand and Singapore).

Annual Licensed Capacities

Mill	Total Licence	Domestic Licence	Percentage
Malayan Flour Mill	183,000mt	160,000mt	87%
Federal Flour Mill	183,000mt	120,000mt	66%
Johor Bahru Flour Mill	40,000mt	26,000mt	65%
United Malayan Flour Mill	66,000mt	40,000mt	61%
Sabah Flour & Feed Mill	50,000mt	50,000mt	100%
Kuantan Flour Mill	55,000mt	55,000mt	100%
TOTAL	577,000mt	451,000mt	78%

The government of Malaysia approves new milling licences based upon three factors: 1) the present total milling capacity; 2) the expected domestic flour demand; and 3) the present export capacity.

5. Current domestic flour demands met by each of the flour mills is estimated as follows:

Mill	Monthly	Annual
Malayan Flour Mill	9-10,000mt	108-120,000mt
Federal Flour Mill	11,000mt	132,000mt
Johor Bahru Flour Mill	4,000mt	36,000mt
United Malayan Flour Mill	5,000mt	60,000mt
Sabah Flour and Feed Mill	4,000mt	36,000mt
Sub-Total	33-34,000mt	372-384,000mt
Kuantan Flour Mill (projected)	3,500mt	42,000mt
TOTAL	37-38,000mt	414-426,000mt

6. Kuantan Flour Mill's management foresees its regional market at about 3,500mt per month in the north eastern area of Peninsular Malaysia from Kuantan north to Kota Bahru and along the Thai boarder, an area now dominated largely by market shares held by Malayan Flour Mill and Federal Flour Mill. Kuantan Flour Mill has been working to establish its market share for several years through a trading/supply firm that is supplying competitve flour presently to a cache of customers that will potentially become Kuantan Flour Mill's customers. This trading concern is also a part owner of Kuantan Flour Mill. The mill's officials are well aquainted with and have had years of experience in the Malaysian milling and grain industry business. They foresee the total market growth to continue at up to 5% anually. Kuantan Flour Mill will market four separate flours; two biscuit/noodle flours at 10.5% and 11% protein and two bread flours at 12.5% and 13.5% protein. It's worthy to note that the flour mill does not have a purifier.

7. A government review of the pricing of basic commodities in March 1986 resulted in a reduction in the maximum retail price of general purpose flour from M$ 0.75 to M$ 0.70/kg or US$ 0.29 to US$ 0.28/kg. Flour is getting cheaper in Malaysia and this should support the continuing upwards swing in demand. The 3% import tax previously levied on wheat imports was totally elimanated in January 1986. The government's regular review of commodity prices is not likely to further reduce flour prices despite the general 30% decline in world wheat prices since March 1986. The mills are not expecting a government mandated price decline in flour largely due to the difficulty posed by necessarily raising flour prices later on if necessary.

CONTACTS

Mr Andrew Tan, Managing Director, KFM
Mr Shaharuddin Shamsuddin, General Manager, KFM
Mr Hoe Yit Nee, Quality Control Manager, KFM
Mr Chow Kek Leng, Production Manager, KFM
Mr Michael Mah, Sales Manager, KFM
Mr Tan Hong Leng, Management co-ordinator, KFM
Frank Tarrant, Agricultural Attache, U.S. Embassy/Malaysia

Tim Oviatt
Timothy M Oviatt
Regional Director, South Asia

TMO:pdr

MSGOUT 132/02/17/87

Date : February 17, 1987

Attn : Rick

URGENT

Please forward the following to Kirk Miller, FGIS Administrator from Bill Shuey as soon as you receive. Thanks.

Quote

Prelim results show :

M/V GERALIA protein ranged 0.7 to 0.9 percent below FGIS Certificate on same moisture basis; average FGIS 14.51, ARS - 13.76, Johor Bahru Mill (JB) 13.79, Federal Flour Mill (FFM) - 13.81. FGIS sublot data, other data on subsamples. Both mills received wheat from vessels. Both mills take AACC check sample service. FFM average difference with AACC is 0.048 percent and JB is 0.01 percent. Both mills showed 0.7 percent less protein than FGIS on destination and origin subsamples.

M/V NASBON at Malayan Flour Mill (MFM) protein ranged 0.2 to 0.7 percent below FGIS Certificate to date on same moisture basis; average FGIS - 14.5, ARS - 14.16, MFM 14.13 on origin samples and MFM (to date) 14.14 on destination samples. No destination samples data for M/V SANKO HARVEST, due in Singapore end of this week, but origin samples show FGIS - 14.6 while Khong Guan FM (Sing) 14.05 and ARS 13.96 percent and for United Malayan FM (UMFM) 13.99 and ARS 13.75 percent.

All data to date 0.3 to 0.7 below FGIS Certificate. Three mills participate in AACC check sample and are less than 0.05 percent off the collaborative mean. Data is consistent. All showing Certificate was too high. Good example, samples representing 3/5 of hold # 2, origin composite protein 14.24, destination 14.16 and FGIS Certificate 14.53.

Unquote

May

END OF ICOM

FGIS' PROTEIN DISCREPANCY STUDY ON HARD RED SPRING WHEAT

COMPARISON OF CERTIFICATED NIR CONTENTS VERSUS THE KJELDAHL PROTEIN CONTENT

Differences in protein results of U.S. wheat arriving at Southeast Asian port destinations, compared to certificated protein results at U.S. origins, have been reported for several years. The problem originally surfaced as a serious problem during the American Soybean Association and the U.S. Feed Grains Council-sponsored Southeast Asia Commodity Marketing Seminar, September 17 through October 7, 1981.

At this seminar in which Dr. William C. Shuey participated, Dr. B. Rachman, Chief, Quality Control and Research, Prima Ltd. (Flour Mills), Singapore, claimed that U.S. shipments of wheat were consistently lower in protein by 0.3 to 0.5 percent on purchased 14.0 percent Dark Northern Spring (DNS) wheat.

Protein shortage was the predominant subject discussed by representatives of the five countries visited during Dr. Shuey's trip to Singapore, the Philippines, Thailand, Taiwan, and Korea.

Subsequently, (1) the U.S. Wheat Associates (USWA) planned and funded studies involving protein determination of U.S.-grown wheat; (2) FGIS became directly involved in conducting the protein studies and comparisons at the request of USWA; and (3) fourteen Asian flour mills were collaborators in these studies. Eight of these mills participated in the January/February 1987 monitoring study.

Prepared chiefly by Dr. William C. Shuey, Chief, International Monitoring Staff, Federal Grain Inspection Service, USDA.

The urgency of the problem was further emphasized by the abrupt change in the difference between certified proteins and destination proteins arriving in Japan. The average difference of vessels prior to July 20, 1986, was 0.08 percent; however, after that time, the average difference of vessels rose to 0.31 percent, according to data supplied by the Japanese Food Agency.

Dr. Shuey's February 11, 1986, report to Dr. Kenneth A. Gilles, then FGIS Administrator, of his January 1986 trip to Singapore, Bangladesh, India, and China, reported that the Singapore mills requested the following:

1. FGIS should not allow sublots up to 0.5 percent below the contracted protein for "minimum" protein contracts.

2. Use of Kjeldahl method for protein determination in lieu of the near-infrared reflectance (NIR) method. At that time it was explained that it would be impossible to do Kjeldahl determinations in a timely manner at U.S. loading ports.

In November 1986, Dr. Shuey met with the following officials of the U.S. Wheat Associates, in Singapore: Winston Wilson, President; Adrian Polansky, Past Chairman; and Tim Oviatt, Regional Director, Southeast Asia. The purpose of the meeting was to discuss continued allegations of protein shortages in shipments of U.S. wheat, specifically those arriving in Southeast Asia.

It was during this meeting that Mr. Oviatt and Dr. Shuey developed final plans for the proposed monitoring study involving FGIS and the Southeast Asian buyers to determine, if possible, why the average protein as determined at destination was 0.2 percent or more lower than what was certificated at origin. The study would commence in early 1987.

It was agreed that a visit to all collaborating mill laboratories would be made prior to the actual monitoring in order to check equipment and laboratory procedures. Catalysts would be sent to Dr. Shuey for FGIS' use in analyzing destination samples after they are sent to Washington.

The December 1986 telex and memorandum from Mr. Oviatt to mills in Thailand, Singapore, and Malaysia, identified the subjects discussed at the November 29 meeting with Dr. Shuey in Singapore:

1. Calibration of slope between brands of NIR machines.

2. Calibration of slope for each brand of NIR machine with Kjeldahl.

3. Approval of plan for Dr. Shuey to personally monitor the discharge and sampling of DNS cargo arrivals in Asia between mid-January and early March 1987 in two separate trips.

The January 6, 1987, memorandum from Mr. Oviatt to Mr. Tom Mick, USWA, requested that Dr. Shuey meet a vessel in Singapore (estimated time of arrival: February 16/17) to monitor the discharge and sampling. The memorandum also advised that United Flour Mill's cargo of 6,000 metric tons of DNS (a separate shipment) loaded in Vancouver, Washington, in December 1986 with a contract specification of minimum 14.7 percent protein, averaged only 14.5 percent based on destination analysis of an 0.5 kilogram shippers' sample received by the buyer on December 25.

Dr. Shuey conducted the monitoring study during the trip to Southeast Asia from January 21 through February 25, 1987. The trip report written March 3, 1987, showed a difference between origin and destination protein results. The preliminary results on 424 determinations were obtained on both the origin subsamples and destination samples and showed that the results within a laboratory were consistent and averaged less than an 0.1 percent difference between origin and destination samples; however, the destination results were 0.3 to 0.8 percent below the official FGIS certificated value. Results between two mill laboratories of the same company averaged essentially the same, showing an 0.001 percent difference.

Five destination laboratories participated in an American Association of Cereal Chemists' Check Sample Service and were within one standard deviation of the mean of the collaboratives. The most recent results were shown in Appendix A. The data from the laboratories was consistent with the data obtained from an Agricultural Research Service (ARS) Laboratory, which also shows lower protein content than was certificated. Kjeldahl digestion/distillation and Keltec equipment were used for determining the protein in the destination laboratories. Sulfuric acid, hydrochloric acid, and boric acid were used in the distillation receiving flask, as well as a variety of indicators.

The results of the monitoring study and other protein studies are given in this report.

Materials and methods:

There are three series of data in this report:

Series 1. Consisted of 10 vessels, 16 lots, and 155 sublots of Hard Red Spring (HRS) wheat received as official formal protein complaints.

The file sublot samples of the 10 vessels for the formal complaints submitted were sent to the FGIS Quality Control Laboratory (QCL) for analysis. The routine FGIS-NIR procedure and FGIS-Kjeldahl method were used. All the data are reported on a 12 percent moisture basis. Statistical analyses were made between and among the data obtained at the loading elevator for protein content with the FGIS-QCL data. A total of 465 protein determinations were made on Series 1 samples.

Series 2. Consisted of 4 vessels, 11 lots, 50 sublots, and 205 subsamples of HRS involved in the monitoring study of HRS shipped to 9 mills in Southeast Asia.

A total of 198 subsamples were taken from 3 vessels at origin, destined for 7 Southeast Asian mills. Also, the 7 file sublot samples were obtained for another vessel destined for 2 Southeast Asian mills. All the samples were subdivided into 4 equal portions: one portion for the FGIS-QCL, one for an ARS Quality Control Laboratory, one for the destination mill (shipped to U.S. Wheat Associates in Singapore for actual distribution), and one maintained by FGIS' International Monitoring Staff (IMS) for analysis in USDA using destination mill laboratory methods. The catalyst and methods of each laboratory were obtained for testing the samples. The samples shipped to Singapore were subdivided to represent the portion of the cargo each destination mill would receive.

Destination samples from the respective mills were collected by regular procedures. The samples were shipped to IMS for analysis in USDA Laboratories. The origin subsamples were selected and/or combined to correspond with the destination samples as collected during unloading of the vessel.

All the protein content data were converted to the 12 percent moisture basis. A total of 932 protein determinations were made on samples from the Series 2 samples.

Series 3. Consisted of 29 export cargoes (57 sublots), 199 railcars, barges and bins (domestic) which were analyzed in the Portland Field Office (PFO) laboratory. The HRS wheat samples reported are from routine monitoring for the months of December 1986; January, February, March 1987; and the first week of April 1987 by the PFO Laboratory. The 10 percent sampling of sublots, carlots, barges, and bins on which protein content was determined at the export elevators were routinely analyzed for protein in the field office by the NIR and Kjeldahl methods. The samples represent wheat passing through the market channels at the time of sampling. A total of 768 protein determinations were made on Series 3 samples.

A grand total of 2,165 protein determinations were made on 621 individual samples.

Results and Discussions:

The sublot data for uncorrected protein content, protein on the 12 percent moisture basis, and differences between origin protein, QCL-NIR and Kjeldahl protein content for Series 1 are shown in Table I.

The data for the differences between Origin-NIR protein and QCL-Kjeldahl protein (Table II) show a range of 0.187 to 0.593 percent, averaging 0.336 percent for the 16 lots of HRS wheat. The differences between QCL-NIR and QCL-Kjeldahl ranged from -0.150 to 0.367 percent, averaging 0.186 percent. These differences (between the Origin-NIR and QCL-Kjeldahl) were similar to the Origin-NIR minus QCL-NIR which ranged from -0.068 to 0.389 percent, averaging 0.151 percent.

Table III shows the correlation matrices of the protein contents at 12 percent moisture basis and the differences in protein contents. The data show high correlation coefficients between the three sets of protein determinations -- Origin-NIR vs. QCL-NIR; Origin-NIR vs. QCL-Kjeldahl; and QCL-NIR vs. QCL-Kjeldahl, of 0.96, 0.98, and 0.98, respectively. Interestingly enough, the same relation did not exist between the differences in protein. The correlation coefficients of the differences in protein between Origin-NIR minus QCL-NIR vs. Origin-NIR minus QCL-Kjeldahl was 0.63, while for Origin-NIR minus QCL-NIR vs. QCL-NIR minus QCL-Kjeldahl was -0.69. Although the magnitudes were similar, the order was opposite. The order and magnitude may be partially attributed to the difference between the means, the difference of 0.15 percent between the Origin-NIR and QCL-NIR's, the 0.19 and 0.34 percents between the NIR's and the QCL-Kjeldahl. However, the data show the average protein certificated values for the 16 lots on the 10 vessels was 0.34 percent higher than the QCL-Kjeldahl value.

The original sublot and subsample protein content and 12 percent moisture basis protein content data for Series 2 are given in Table IV. The 12 percent moisture basis data and differences between the protein contents are given in Table V. Table VI summarizes the protein differences for the 50 sublots in Table V from Series 2. The data in Table VII gives the mean, standard deviation, minimum and maximum values for the differences of all possible combinations. The data show an average difference of 0.36 percent higher protein content for the Origin-NIR (certificated value) than the QCL-Kjeldahl average protein content with a range of -0.13 to 0.66. This agrees well with the 0.34 protein percent which had a range of 0.187 to 0.59 percent in Series 1. The combined average difference between protein content of the Origin-NIR and the QCL-Kjeldahl for the two series was 0.36 percent. The average difference between QCL-NIR and QCL-Kjeldahl was 0.27 percent protein. This compares with the average of 0.19 percent for Series 1 data. The combined difference for the two series was 0.25 percent.

The data showed a difference of 0.32 percent between the Origin-NIR and QCL-Kjeldahl. The difference between the QCL-NIR and QCL-Kjeldahl was 0.25 percent, while the difference between Origin-NIR and QCL-NIR was 0.10 percent.

The latter case could be expected to show the least difference because the instruments respond alike to the samples; however, in the case of Kjeldahl vs. NIR, this may not be true due to the kind of measurement and factors that influence the results. For Kjeldahl vs. NIR at a given location, the two QCL determinations should be the least, since there is greater control, ideal environment, one instrument, and a minimum number of operators.

The data in Table VII show that the average differences between Kjeldahl proteins at destination on samples taken at origin and corresponding samples taken at destination are -0.04 percent. This would indicate that sampling was not a factor in the apparent difference between origin data and destination data. The average differences between the various origin locations and the various destination laboratories were not constant; however, the average differences between a particular origin location and destination mill were consistent. This indicates the differences between orgin and destination are, in fact real. The average difference between QCL and destination Kjeldahl proteins on the divided samples was 0.15 percent (destination was higher) with a range of -0.43 to 0.41 percent. This average difference is within the range and further indicates the NIR values were in error.

Series 3 data presented in Table VIII were analyzed separately by month and, in Table IX, by export and domestic samples; 23.55 percent were export, and 76.45 percent were domestic samples. For the 57 export sublots analyzed (Table IX), the average mean difference between Origin-NIR and Portland-Kjeldahl was 0.25 percent higher for the NIR results with a range of -0.27 to 0.79 percent. This compared with the overall difference of Series 1 and Series 2 of 0.36 percent, but was run on a different Kjeldahl unit. For the 185 export samples, Portland-NIR minus Portland-Kjeldahl, the average differences were 0.12 percent. The average difference between Origin-NIR minus Portland-NIR was 0.13 percent, which compared with 0.10 percent for the combined Series 1 and Series 2 data.

The domestic data are similar to the export data except they showed greater variability. The greater variation would be expected because of blending practices in the elevator prior to export. The average difference for domestic samples Origin-NIR minus Portland-Kjeldahl was 0.18 percent, but ranged from -0.54 to 0.82 percent. This compares with 0.25 percent for the export data. The average protein difference between Portland-NIR minus Portland-Kjeldahl was 0.06 percent, compared to the export average difference of 0.12 percent. The average protein difference between Origin-NIR minus Portland-NIR was 0.13 percent, compared with 0.13 percent for export samples and 0.10 for the combined Series 1 and Series 2 samples.

Frequency distribution of the data (Table X) showed that for 61 percent of the export samples, NIR results were 0.2 percent or more higher in protein than the Portland-Kjeldahl results, averaging 0.40. Only 50 percent of the domestic samples had NIR protein results that were 0.2 percent or more higher than the Kjeldahl results, but still averaged 0.40 percent. This substantiated that over 50 percent of the samples certified on the NIR gave proteins averaging over 0.4 higher than the Kjeldahl results. Only 14 percent of the export samples and 22 percent of the domestic samples resulted in Kjeldahl values below the NIR results, with averages of -0.12 and -0.17 percent, respectively. This data further substantiated that the NIR's consistently, on the average, gave protein results higher than Kjeldahl results.

The combined results of the 3 series representing 588 samples collected from June 14, 1986, through April 1, 1987, showed an average difference between Origin-NIR and Kjeldahl protein of 0.27 percent, ranging from -0.47 to 1.23 percent.

The analysis of variance of protein content for 361 samples tested on a paired comparison basis between the QCTB NIR and Kjeldahl results (Table XI) showed a significant difference between the results. The data revealed the NIR protein values on an average were 0.24 percent higher than the Kjeldahl protein values. Since the determinations were made under the most ideal conditions, greater differences could be expected between NIR and Kjeldahl results when samples were run on NIR's at export locations. The data verified that the NIR's did not predict the Kjeldahl accurately.

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB				^12% m.b.			DIFFERENCES	
				NIR	K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
2-SL/1	9.4	14.9	9.85	14.6	14.5	14.472	14.252	14.154	0.221	0.318	0.098
2-SL/2	10.5	15.2	10.66	14.8	14.9	14.945	14.578	14.677	0.367	0.269	-0.099
2-SL/3	11.8	15.3	11.59	14.9	15.2	15.265	14.831	15.130	0.434	0.136	-0.299
2-SL/4	11.9	15.1	11.69	14.6	14.9	15.083	14.549	14.848	0.534	0.235	-0.299
						14.941	14.552	14.702	0.389	0.239	-0.150
3-SL/1	10.9	13.2	10.95	12.8	12.6	13.037	12.649	12.451	0.388	0.586	0.198
3-SL/2	11.0	13.2	10.85	12.8	12.9	13.052	12.635	12.734	0.417	0.318	-0.099
3-SL/3	10.9	13.2	10.85	12.9	12.9	13.037	12.734	12.734	0.303	0.303	0.000
3-SL/4	11.2	13.3	11.17	12.9	12.8	13.180	12.779	12.680	0.401	0.500	0.099
3-SL/5	9.9	13.4	10.34	12.8	12.8	13.088	12.563	12.563	0.525	0.525	0.000
3-SL/6	9.7	13.1	9.86	12.8	12.7	12.766	12.496	12.398	0.270	0.368	0.098
						13.027	12.643	12.593	0.384	0.433	0.049
4-SL/1	11.5	13.3	10.61	13.1	13.0	13.225	12.896	12.798	0.329	0.427	0.098
4-SL/2	10.9	13.5	10.73	13.2	13.1	13.333	13.012	12.914	0.321	0.420	0.099
						13.279	12.954	12.856	0.325	0.423	0.099
SL/1	12.5	14.1	12.60	14.0	13.8	14.181	14.096	13.895	0.084	0.286	0.201
SL/2	12.8	14.0	12.70	13.7	13.5	14.128	13.810	13.608	0.319	0.520	0.202
SL/3	12.8	14.0	12.50	13.9	13.9	14.128	13.979	13.979	0.149	0.149	0.000
SL/4	12.6	14.3	12.60	13.7	13.6	14.398	13.794	13.693	0.604	0.705	0.101
SL/5	12.7	13.7	12.60	14.0	13.9	13.810	14.096	13.995	-0.286	-0.186	0.101
SL/6	12.9	14.0	12.60	13.9	13.8	14.145	13.995	13.895	0.149	0.250	0.101
SL/7	12.7	14.2	12.60	14.1	14.0	14.314	14.197	14.096	0.117	0.218	0.101
SL/8	12.7	14.4	12.60	14.2	14.2	14.515	14.297	14.297	0.218	0.218	0.000
SL/9	12.8	14.0	12.60	13.8	13.8	14.128	13.895	13.895	0.234	0.234	0.000
SL/10	12.8	14.1	12.60	13.9	13.9	14.229	13.995	13.995	0.234	0.234	0.000

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB			*12% m.b.			DIFFERENCES		
				NIR	K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
SL/11	13.0	13.8	12.90	13.6	13.1	13.959	13.741	13.235	0.218	0.723	0.505
SL/12	13.0	13.9	13.00	13.5	13.4	14.060	13.655	13.554	0.405	0.506	0.101
SL/13	12.8	14.2	12.70	14.1	14.0	14.330	14.213	14.112	0.117	0.218	0.101
SL/14	12.7	14.2	12.70	14.0	14.0	14.314	14.112	14.112	0.202	0.202	0.000
SL/15	12.7	14.5	12.50	14.1	14.0	14.616	14.181	14.080	0.436	0.536	0.101
SL/16	12.5	14.1	12.20	14.0	13.9	14.181	14.032	13.932	0.149	0.249	0.100
SL/17	12.6	14.2	12.10	13.9	13.9	14.297	13.916	13.916	0.382	0.382	0.000
						14.220	14.000	13.899	0.219	0.320	0.101
2-SL/1	9.3	14.4	9.60	14.2	14.0	13.971	13.823	13.628	0.148	0.343	0.195
2-SL/2	9.1	14.9	9.10	14.6	14.2	14.425	14.134	13.747	0.290	0.678	0.387
						14.198	13.979	13.688	0.219	0.510	0.291
4-SL/1	10.1	14.0	10.10	14.4	14.1	13.704	14.096	13.802	-0.392	-0.098	0.294
4-SL/2	11.2	14.5	10.70	14.5	14.3	14.369	14.289	14.092	0.080	0.278	0.197
4-SL/3	9.9	14.8	9.60	14.8	14.3	14.455	14.407	13.920	0.048	0.535	0.487
4-SL/4	10.7	14.8	10.60	14.7	14.2	14.585	14.470	13.978	0.115	0.607	0.492
						14.278	14.315	13.948	-0.037	0.330	0.367
10-SL/1	10.3	14.5	10.00	14.4	14.0	14.225	14.080	13.689	0.145	0.536	0.391
10-SL/2	10.9	14.0	10.80	14.2	13.8	13.827	14.009	13.614	-0.182	0.213	0.395
10-SL/3	10.3	14.4	10.00	14.6	14.4	14.127	14.276	14.080	-0.148	0.047	0.196
10-SL/4	11.6	14.1	10.60	14.6	14.3	14.036	14.371	14.076	-0.335	-0.040	0.295
10-SL/5	9.9	14.5	9.50	14.2	14.1	14.162	13.808	13.710	0.354	0.452	0.097
10-SL/6	9.1	14.6	9.40	14.4	14.1	14.134	13.987	13.695	0.147	0.439	0.291
10-SL/7	9.8	14.8	9.80	14.8	14.7	14.439	14.439	14.341	0.000	0.098	0.098
10-SL/8	9.2	14.7	9.20	14.8	14.6	14.247	14.344	14.150	-0.097	0.097	0.194
10-SL/9	10.4	14.7	10.00	14.8	14.8	14.438	14.471	14.471	-0.034	-0.034	0.000

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB			^12% m.b.			DIFFERENCES		
			NIR		K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
10-SL/10	9.1	14.9	8.90	14.8	14.4	14.425	14.296	13.910	0.128	0.515	0.386
						14.206	14.208	13.974	-0.002	0.232	0.234
14-SL/1	9.6	14.3	9.50	13.9	13.9	13.920	13.516	13.516	0.404	0.404	0.000
14-SL/2	11.2	14.2	10.50	14.3	14.2	14.072	14.060	13.962	0.012	0.110	0.098
14-SL/3	9.8	14.4	9.60	14.4	14.3	14.049	14.018	13.920	0.031	0.128	0.097
14-SL/4	10.1	14.3	9.90	14.3	14.0	13.998	13.967	13.674	0.031	0.324	0.293
14-SL/5	10.8	14.4	10.70	14.4	14.2	14.206	14.190	13.993	0.016	0.213	0.197
14-SL/6	10.2	14.2	10.10	14.3	14.1	13.915	13.998	13.802	-0.082	0.113	0.196
14-SL/7	9.5	14.3	9.60	14.9	14.6	13.905	14.504	14.212	-0.599	-0.307	0.292
14-SL/8	9.2	14.3	9.50	14.3	14.1	13.859	13.905	13.710	-0.046	0.149	0.194
14-SL/9	10.2	14.6	10.10	14.5	14.2	14.307	14.194	13.900	0.114	0.407	0.294
14-SL/10	8.8	15.0	8.80	14.5	14.3	14.474	13.991	13.798	0.482	0.675	0.193
14-SL/11	9.5	15.0	9.60	14.7	14.3	14.586	14.310	13.920	0.276	0.665	0.389
14-SL/12	8.7	15.0	8.90	14.6	14.2	14.458	14.103	13.717	0.355	0.741	0.386
14-SL/13	11.5	14.1	11.10	14.1	14.0	14.020	13.957	13.858	0.063	0.162	0.099
14-SL/14	9.1	14.6	8.80	14.7	14.1	14.134	14.184	13.605	-0.050	0.529	0.579
						14.136	14.064	13.828	0.072	0.308	0.236
SL/1	10.0	14.5	9.95	14.8	14.6	14.178	14.463	14.268	-0.285	-0.090	0.195
SL/2	9.8	15.0	9.83	15.0	14.9	14.634	14.639	14.541	-0.005	0.093	0.098
SL/3	10.3	14.6	10.02	14.7	14.5	14.323	14.377	14.181	-0.053	0.142	0.196
SL/4	9.7	14.5	9.62	14.5	14.3	14.131	14.118	13.923	0.013	0.207	0.195
SL/5	10.1	15.2	9.90	15.0	14.9	14.879	14.650	14.553	0.228	0.326	0.098
SL/6	10.0	14.9	10.02	15.0	14.6	14.569	14.670	14.279	-0.101	0.290	0.391
SL/7	10.2	15.2	10.09	15.0	15.0	14.895	14.681	14.681	0.214	0.214	0.000
SL/8	10.3	14.7	10.42	14.5	14.2	14.421	14.244	13.950	0.177	0.472	0.295
SL/9	10.5	14.4	10.34	14.6	14.2	14.159	14.330	13.937	-0.171	0.222	0.393

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB				12% m.b.		DIFFERENCES		
				NIR	K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
SL/10	10.0	15.1	10.14	15.1	14.7	14.764	14.787	14.396	-0.023	0.369	0.392
SL/11	9.6	14.9	9.54	15.0	14.6	14.504	14.592	14.203	-0.088	0.301	0.389
SL/12	11.1	14.9	11.02	14.7	14.3	14.749	14.538	14.143	0.211	0.607	0.396
SL/13	9.7	15.0	9.94	14.6	14.4	14.618	14.266	14.071	0.352	0.547	0.195
						14.525	14.489	14.240	0.036	0.285	0.249
3-SL/1	11.0	14.4	11.48	14.3	14.1	14.238	14.216	14.017	0.022	0.221	0.199
						14.238	14.216	14.017	0.022	0.221	0.199
4-SL/1	10.4	14.3	10.87	15.0	14.7	14.634	14.810	14.514	-0.176	0.120	0.296
4-SL/2	10.8	14.9	10.69	14.7	14.5	14.700	14.484	14.287	0.215	0.412	0.197
4-SL/3	10.5	15.3	11.04	14.8	14.6	15.044	14.640	14.442	0.403	0.601	0.198
4-SL/4	9.4	14.8	9.58	14.8	14.6	14.375	14.404	14.209	-0.029	0.166	0.195
						14.688	14.585	14.363	0.103	0.325	0.221
SL/1	11.5	13.9	11.63	13.7	13.6	13.821	13.643	13.543	0.179	0.278	0.100
SL/2	11.6	13.9	11.40	13.8	13.6	13.837	13.707	13.508	0.131	0.329	0.199
SL/3	11.6	13.7	11.51	13.7	13.7	13.638	13.624	13.624	0.014	0.014	0.000
SL/4	11.3	14.2	11.31	14.0	13.7	14.088	13.891	13.593	0.197	0.495	0.298
SL/5	11.3	14.3	11.26	14.2	14.1	14.187	14.082	13.982	0.106	0.205	0.099
SL/6	11.1	14.2	11.23	14.2	14.0	14.056	14.077	13.879	-0.021	0.178	0.198
SL/7	11.3	14.2	11.45	14.0	14.0	14.088	13.913	13.913	0.175	0.175	0.000
SL/8	11.1	14.4	11.42	14.0	13.9	14.254	13.908	13.809	0.346	0.445	0.099
SL/9	11.2	13.7	11.37	13.9	13.7	13.577	13.801	13.603	-0.225	-0.026	0.199
SL/10	11.2	13.9	11.51	13.8	13.6	13.775	13.724	13.525	0.051	0.250	0.199
SL/11	11.2	13.8	11.37	13.7	13.5	13.676	13.603	13.404	0.073	0.272	0.199
SL/12	11.4	13.9	11.40	13.8	13.6	13.806	13.707	13.508	0.099	0.298	0.199
SL/13	11.8	13.8	11.73	13.7	13.5	13.769	13.658	13.459	0.111	0.310	0.199

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB			12% m.b.			DIFFERENCES		
				NIR	K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
SL/14	11.7	13.8	11.69	13.9	13.6	13.753	13.851	13.552	-0.098	0.201	0.299
SL/15	11.6	13.8	11.65	13.9	13.8	13.738	13.845	13.745	-0.107	-0.008	0.100
SL/16	11.4	14.2	11.32	14.1	13.7	14.104	13.992	13.595	0.112	0.509	0.397
SL/17	11.6	14.0	11.48	14.1	13.8	13.937	14.017	13.719	-0.081	0.218	0.298
						13.888	13.826	13.645	0.062	0.244	0.181
SL/1	10.5	14.3	10.92	14.1	13.6	14.060	13.929	13.435	0.131	0.625	0.494
SL/2	10.8	14.3	11.04	14.0	13.7	14.108	13.849	13.552	0.259	0.555	0.297
SL/3	10.8	14.1	11.01	13.8	13.6	13.910	13.646	13.449	0.264	0.462	0.198
SL/4	10.7	14.2	10.94	13.9	13.8	13.993	13.735	13.636	0.259	0.358	0.099
SL/5	10.7	14.4	10.89	13.9	13.5	14.190	13.727	13.332	0.464	0.859	0.395
SL/6	10.5	14.2	10.69	13.8	13.7	13.962	13.598	13.499	0.364	0.463	0.099
SL/7	10.4	14.3	10.58	13.9	13.8	14.045	13.679	13.581	0.365	0.464	0.098
SL/8	10.6	14.3	10.04	14.1	13.9	14.076	13.793	13.597	0.283	0.479	0.196
SL/9	10.2	14.0	10.38	13.8	13.7	13.719	13.551	13.452	0.169	0.267	0.098
SL/10	11.3	14.0	10.33	13.8	13.6	13.890	13.543	13.347	0.347	0.543	0.196
SL/11	11.8	13.9	11.66	13.8	13.8	13.868	13.747	13.747	0.122	0.122	0.000
SL/12	11.6	14.0	11.66	14.0	13.9	13.937	13.946	13.847	-0.009	0.090	0.100
SL/13	11.5	14.0	11.62	14.0	13.9	13.921	13.940	13.840	-0.019	0.081	0.100
SL/14	11.6	13.8	11.57	13.9	13.7	13.738	13.832	13.633	-0.095	0.104	0.199
SL/15	11.3	13.9	11.58	13.9	13.7	13.790	13.834	13.635	-0.044	0.155	0.199
SL/16	11.5	14.0	11.57	13.8	13.6	13.921	13.733	13.534	0.188	0.387	0.199
SL/17	11.6	14.0	11.78	13.7	13.5	13.937	13.666	13.466	0.271	0.470	0.200
SL/18	11.0	14.2	11.22	14.0	13.8	14.040	13.877	13.679	0.163	0.362	0.198
						13.950	13.757	13.570	0.193	0.380	0.187
SL/1	10.4	14.3	10.64	14.0	13.9	14.045	13.787	13.688	0.258	0.356	0.098
SL/2	9.8	14.2	10.04	14.1	13.7	13.854	13.793	13.402	0.061	0.452	0.391

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB				*12% m.b.		DIFFERENCES		
				NIR	K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
SL/3	10.0	14.0	10.23	13.8	13.6	13.689	13.528	13.332	0.161	0.357	0.196
SL/4	10.6	14.0	10.68	13.8	13.9	13.781	13.596	13.695	0.185	0.086	-0.099
SL/5	10.0	14.0	10.19	14.0	13.7	13.689	13.718	13.424	-0.029	0.265	0.294
SL/6	9.9	13.8	9.84	13.7	13.1	13.478	13.372	12.786	0.107	0.692	0.586
SL/7	9.9	13.6	9.84	13.4	13.0	13.283	13.079	12.689	0.204	0.594	0.390
SL/8	9.8	13.5	9.84	13.8	13.4	13.171	13.469	13.079	-0.299	0.092	0.390
SL/9	10.0	13.8	9.61	14.1	13.8	13.493	13.727	13.435	-0.234	0.058	0.292
SL/10	10.2	13.8	10.05	14.0	13.8	13.523	13.696	13.501	-0.173	0.023	0.196
SL/11	9.6	14.1	9.39	14.2	14.0	13.726	13.791	13.597	-0.065	0.129	0.194
SL/12	9.8	14.0	9.73	14.1	13.8	13.659	13.745	13.453	-0.087	0.206	0.292
SL/13	9.7	14.2	9.63	14.2	13.9	13.838	13.828	13.535	0.011	0.303	0.292
SL/14	10.1	14.0	9.99	14.4	14.3	13.704	14.078	13.981	-0.374	-0.277	0.098
SL/15	9.6	14.1	9.59	14.5	14.2	13.726	14.113	13.821	-0.388	-0.096	0.292
SL/16	9.8	14.2	9.47	14.1	14.1	13.854	13.706	13.706	0.148	0.148	0.000
SL/17	9.8	14.2	9.95	14.3	14.0	13.854	13.974	13.681	-0.121	0.172	0.293
SL/18	10.2	13.7	10.34	13.8	13.6	13.425	13.545	13.348	-0.119	0.077	0.196
SL/19	9.6	14.2	9.43	14.4	14.2	13.823	13.991	13.797	-0.168	0.026	0.194
SL/20	10.0	14.0	9.93	14.2	13.9	13.689	13.874	13.581	-0.185	0.108	0.293
SL/21	9.6	13.9	9.39	13.9	13.8	13.531	13.500	13.402	0.031	0.128	0.097
SL/22	10.2	14.0	10.03	14.1	13.9	13.719	13.791	13.596	-0.072	0.124	0.196
SL/23	9.5	13.6	9.53	13.7	13.3	13.224	13.326	12.937	-0.102	0.287	0.389
SL/24	10.7	14.0	10.43	14.1	13.8	13.796	13.853	13.558	-0.057	0.238	0.295
SL/25	10.3	14.2	10.38	14.3	14.0	13.931	14.042	13.747	-0.111	0.184	0.295
SL/26	10.0	14.0	9.83	14.1	13.9	13.689	13.761	13.565	-0.072	0.123	0.195
SL/27	10.4	14.1	10.33	14.1	13.5	13.848	13.837	13.249	0.011	0.600	0.589
SL/28	10.6	14.0	10.38	14.2	14.1	13.781	13.943	13.845	-0.163	-0.064	0.098
SL/29	10.5	13.6	10.27	13.9	13.8	13.372	13.632	13.534	-0.260	-0.162	0.098
						14.150	14.218	13.963	-0.068	0.187	0.255

TABLE I - SUBLOT DATA COMPARISON ON PROTEIN COMPLAINTS

SUBLOT #	ORIGIN NIR		QCTB			12% m.b.			DIFFERENCES		
				NIR	K-J	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P	%P
SL/1	10.8	15.0	11.00	14.6	14.3	14.798	14.436	14.139	0.362	0.659	0.297
SL/2	10.8	15.0	11.20	14.6	14.4	14.798	14.468	14.270	0.330	0.528	0.198
						14.798	14.452	14.205	0.346	0.593	0.247
SL/1	11.0	14.1	11.20	14.1	13.8	13.942	13.973	13.676	-0.031	0.266	0.297
SL/2	10.5	14.0	10.50	14.2	14.2	13.765	13.962	13.962	-0.197	-0.197	0.000
SL/3	10.8	14.0	10.80	13.9	13.8	13.812	13.713	13.614	0.099	0.197	0.099
SL/4	10.6	13.9	10.60	13.7	13.6	13.682	13.485	13.387	0.197	0.295	0.098
SL/5	10.9	14.0	10.90	13.9	13.7	13.827	13.728	13.531	0.099	0.296	0.198
SL/6	10.9	13.9	11.00	13.9	13.8	13.728	13.744	13.645	-0.015	0.083	0.099
SL/7	11.1	13.9	11.10	13.8	13.7	13.759	13.660	13.561	0.099	0.198	0.099
SL/8	10.8	14.1	10.90	13.9	13.7	13.910	13.728	13.531	0.182	0.379	0.198
SL/9	11.0	14.0	11.00	13.9	13.9	13.843	13.744	13.744	0.099	0.099	0.000
SL/10	10.0	14.3	10.10	13.8	13.7	13.982	13.508	13.410	0.474	0.572	0.098
SL/11	10.5	14.0	10.20	13.8	13.2	13.765	13.523	12.935	0.242	0.830	0.588
SL/12	10.3	14.1	10.40	13.7	13.3	13.833	13.455	13.063	0.377	0.770	0.393
SL/13	9.9	14.1	10.10	13.9	13.4	13.771	13.606	13.117	0.165	0.655	0.489
						13.817	13.679	13.475	0.138	0.342	0.204

KEY:

NPE = Origin-NIR porotein or certificated protein
NPK = QCL-NIR protein
KPK = QCL-Kjeldahl protein
%M = Percent moisture
%P = Percent protein
% m.b. = 12 percent moisture basis

TABLE II - LOT DATA COMPARISON ON PROTEIN COMPLAINTS

LOT #	12% m.b.			DIFFERENCES		
	NPE	NPK	KPK	NPE-NPK	NPE-KPK	NPK-KPK
	%P	%P	%P	%P	%P	%P
1	14.941	14.552	14.702	0.389	0.239	-0.150
2	13.027	12.643	12.593	0.384	0.433	0.049
3	13.279	12.954	12.856	0.325	0.423	0.099
4	14.220	14.000	13.899	0.219	0.320	0.101
5	14.198	13.979	13.688	0.219	0.510	0.291
6	14.278	14.315	13.948	-0.037	0.330	0.367
7	14.206	14.208	13.974	-0.002	0.232	0.234
8	14.136	14.064	13.828	0.072	0.308	0.236
9	14.525	14.489	14.240	0.036	0.285	0.249
10	14.238	14.216	14.017	0.022	0.221	0.199
11	14.688	14.585	14.363	0.103	0.325	0.221
12	13.888	13.826	13.645	0.062	0.244	0.181
13	13.950	13.757	13.570	0.193	0.380	0.187
14	13.662	13.727	13.481	-0.066	0.180	0.246
15	14.798	14.452	14.205	0.346	0.593	0.247
16	13.817	13.679	13.475	0.138	0.342	0.204

KEY:

NPE = Origin-NIR porotein or certificated protei
NPK = QCL-NIR protein
KPK = QCL-Kjeldahl protein
%P = Percent protein
% m.b. = 12 percent moisture basis

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---------------------- CORRELATION MATRIX ----------------------


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       TABLE III - PROTEIN COMPLAINTS DATA COMPARISON

              NPE       NPK       KPK  NPE-NPK  NPE-KPK  NPK-KPK
NPE       1.00000
NPK        .96175   1.00000
KPK        .97817    .97631   1.00000
NPE-NPK   -.16145   -.42562   -.28606  1.00000
NPE-KPK   -.13965   -.30349   -.34238   .63221  1.00000
NPK-KPK    .07487    .25981    .04470  -.68847   .12667  1.00000

CRITICAL VALUE (1-TAIL, .05) = + Or -  .42706
CRITICAL VALUE (2-tail, .05) =    +/-  .49580

N = 16

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KEY:
NPE = Origin-NIR protein or certified protein
NPK = QCL-NIR protein
KPK = QCL-Kjeldahl protein

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB	12% m.b.	ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
L2-SL/1	12.10	14.57	10.57	14.61	10.54	14.41	10.44	14.31	12.12	14.58	12.36	14.04	14.59	14.38	14.17	14.06	14.60	14.10
L2-SL/2	12.20	14.39	10.53	14.45	10.45	14.19	10.41	14.08	12.30	14.16	12.36	14.17	14.42	14.21	13.94	13.83	14.21	14.23
L2-SL/3	12.00	14.57	10.66	14.67	10.68	14.33	10.68	14.22	12.33	13.90	12.36	14.08	14.57	14.45	14.12	14.01	13.95	14.14
L2-SL/4	12.30	14.38	10.78	14.29	10.72	14.13	10.73	14.02	13.33	13.83	12.36	14.04	14.43	14.09	13.93	13.82	14.04	14.10
L2-MEAN	12.15	14.48	10.64	14.51	10.60	14.27	10.57	14.16	12.52	14.12	12.36	14.08	14.50	14.28	14.04	13.93	14.20	14.14
L1-SL/1	10.09	14.84	10.71	14.62	10.64	14.58	10.64	14.47	12.30	14.10	12.35	14.09	14.52	14.41	14.36	14.25	14.15	14.15
L1-SL/2	10.17	15.18	10.33	14.73	10.30	14.56	10.26	14.45	12.20	14.20	12.40	14.10	14.87	14.46	14.28	14.17	14.23	14.16
L1-SL/3	10.38	15.07	10.58	14.57	10.57	14.49	9.95	14.48	12.30	14.00	12.30	14.06	14.80	14.34	14.26	14.15	14.05	14.11
L1-MEAN	10.21	15.03	10.54	14.64	10.50	14.54	10.28	14.47	12.27	14.10	12.35	14.08	14.73	14.40	14.30	14.19	14.14	14.14
H2-SL/1 1-1	12.10	14.40	10.92	14.62	10.64	14.64	11.90	14.70	12.15	14.24	12.28	14.34	14.42	14.44	14.42	14.68	14.26	14.39

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS			DESTINATION			12% m.b. ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
1-2	12.10	14.40	11.11	15.23	10.85	15.08	12.60	14.60	12.36	14.35	12.62	14.47	14.42	15.08	14.89	14.70	14.41	14.57
1-3	12.10	14.40	11.05	14.90	10.84	14.67	12.50	14.50	12.23	14.05	11.41	14.57	14.42	14.74	14.48	14.58	14.09	14.47
1-4	12.10	14.40	11.00	14.88	10.76	14.77	12.80	14.10	12.52	14.24	12.24	14.42	14.42	14.71	14.56	14.23	14.32	14.46
1-5	12.10	14.40	11.22	14.64	11.06	14.50	13.00	14.10	12.55	14.10	12.49	14.02	14.42	14.51	14.35	14.26	14.19	14.10
1-6	12.10	14.40	11.03	14.83	10.80	14.76	12.70	14.40	12.30	14.17	12.64	14.12	14.42	14.67	14.56	14.52	14.22	14.22
SL/1-MEAN	12.10	14.40	11.06	14.85	10.83	14.74	12.58	14.40	12.35	14.19	12.28	14.32	14.42	14.69	14.54	14.50	14.25	14.37
H2-SL/2																		
2-1	11.10	14.60	10.58	14.45	10.34	14.29	11.90	14.20	11.81	13.83	11.61	14.33	14.45	14.22	14.03	14.18	13.80	14.27
2-2	11.10	14.60	10.57	14.34	10.39	14.29	12.10	13.70	11.88	13.84	11.75	13.95	14.45	14.11	14.03	13.72	13.82	13.91
2-3	11.10	14.60	10.60	14.62	10.39	14.32	11.90	13.90	11.89	13.85	11.96	14.24	14.45	14.39	14.06	13.88	13.83	14.23
2-4	11.10	14.60	10.43	14.96	10.22	14.54	12.00	14.00	11.83	13.93	11.74	14.16	14.45	14.70	14.25	14.00	13.90	14.12
2-5	11.10	14.60	9.88	14.90	9.61	14.72	11.70	14.30	11.75	14.07	11.60	14.24	14.45	14.55	14.33	14.25	14.03	14.18
SL/2-MEAN	11.10	14.60	10.41	14.65	10.19	14.43	11.92	14.02	11.83	13.90	11.73	14.18	14.45	14.39	14.14	14.01	13.88	14.14
H2-SL/3																		
3-1	12.00	14.50	10.86	14.96	10.64	14.81	12.60	14.00	12.58	14.14	11.60	14.24	14.50	14.77	14.58	14.10	14.23	14.18
3-2	12.00	14.50	10.91	14.86	10.68	14.72	12.80	14.20	12.63	14.27	11.60	14.26	14.50	14.68	14.50	14.33	14.37	14.20
3-3	12.00	14.50	10.94	14.83	10.65	14.95	12.70	14.30	12.59	14.41	11.60	14.36	14.50	14.65	14.72	14.41	14.51	14.30
3-4	12.00	14.50	10.70	15.22	10.49	14.82	12.00	14.10	12.21	14.45	11.04	13.91	14.50	15.00	14.57	14.10	14.48	13.76

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
3-5	12.00	14.50	10.54	15.16	10.22	14.73	12.10	14.30	12.43	14.36	11.71	14.19	14.50	14.91	14.44	14.32	14.43	14.14
3-6	12.00	14.50	10.54	15.07	10.22	14.76	12.30	14.10	11.95	14.11	11.39	14.19	14.50	14.82	14.47	14.15	14.10	14.09
SL/3-MEAN	12.00	14.50	10.75	15.02	10.48	14.80	12.42	14.17	12.40	14.29	11.49	14.19	14.50	14.81	14.55	14.23	14.35	14.11
H2-SL/4																		
4-1	10.90	14.50	9.93	14.61	9.60	14.40	11.20	14.30	10.95	14.12	11.25	14.33	14.32	14.27	14.02	14.17	13.95	14.21
4-2	10.90	14.50	9.84	14.66	9.53	14.36	11.30	14.20	11.18	13.99	11.62	14.04	14.32	14.31	13.97	14.09	13.86	13.98
4-3	10.90	14.50	10.39	14.40	10.02	14.20	10.90	14.30	11.00	13.90	11.04	14.06	14.32	14.14	13.89	14.12	13.74	13.91
4-4	10.90	14.50	10.30	14.58	9.94	14.22	11.20	14.00	11.20	13.94	11.42	14.11	14.32	14.30	13.89	13.87	13.81	14.02
4-5	10.90	14.50	10.24	14.40	9.89	14.14	11.30	14.00	11.46	13.85	11.41	14.15	14.32	14.12	13.81	13.89	13.77	14.06
4-6	10.90	14.50	10.20	14.79	9.88	14.47	11.20	14.40	11.05	14.08	11.78	13.95	14.32	14.49	14.13	14.27	13.93	13.92
SL/4-MEAN	10.90	14.50	10.15	14.57	9.81	14.30	11.18	14.20	11.14	13.98	11.42	14.11	14.32	14.27	13.95	14.07	13.84	14.01
H2-SL/5																		
5-1	10.70	15.10	10.29	15.05	10.01	14.79	11.40	14.30	11.24	14.41	11.31	14.14	14.88	14.76	14.46	14.20	14.29	14.03
5-2	10.70	15.10	10.29	15.12	10.04	14.78	11.60	14.80	11.20	14.48	11.78	14.10	14.88	14.83	14.46	14.73	14.35	14.06
5-3	10.70	15.10	10.24	15.01	9.96	14.70	11.30	14.70	10.61	14.58	11.78	14.17	14.88	14.72	14.37	14.58	14.35	14.13
5-4	10.70	15.10	10.18	15.08	9.95	14.64	11.50	14.60	10.72	14.62	11.52	14.08	14.88	14.77	14.31	14.52	14.41	14.00
5-5	10.70	15.10	10.20	14.97	9.94	14.94	11.40	14.50	11.32	14.57	11.61	14.12	14.88	14.67	14.60	14.40	14.46	14.06
5-6	10.70	15.10	10.21	15.29	9.96	15.02	11.50	14.80	11.27	14.69	11.64	14.10	14.98	14.99	14.68	14.72	14.57	14.04

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	O	K-J	O	K-J	O	K-J:E	O	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
SL/5-MEAN	10.70	15.10	10.24	15.09	9.98	14.81	11.45	14.62	11.06	14.56	11.61	14.12	14.88	14.79	14.48	14.53	14.40	14.06
H2-SL/6																		
6-1	11.50	14.40	10.13	15.14	9.86	14.95	11.70	14.50	10.71	14.66	11.62	14.33	14.32	14.82	14.60	14.45	14.45	14.27
6-2	11.50	14.40	10.28	14.75	10.01	14.52	11.40	14.10	11.27	14.25	11.67	14.14	14.32	14.47	14.20	14.00	14.13	14.09
6-3	11.50	14.40	10.31	14.61	10.08	14.34	11.90	13.70	11.56	13.69	11.81	14.19	14.32	14.33	14.03	13.68	13.62	14.16
6-4	11.50	14.40	10.33	14.32	10.08	14.17	12.00	14.10	11.62	13.84	12.01	14.15	14.32	14.05	13.87	14.10	13.78	14.15
6-5	11.50	14.40	10.75	14.31	10.52	14.18	12.80	13.90	12.17	13.80	11.80	14.24	14.32	14.11	13.95	14.03	13.83	14.21
6-6	11.50	14.40	10.61	14.42	10.37	14.36	12.50	13.80	11.17	14.05	11.93	14.10	14.32	14.20	14.10	13.88	13.92	14.09
SL/6-MEAN	11.50	14.40	10.40	14.59	10.15	14.42	12.05	14.02	11.42	14.05	11.81	14.19	14.32	14.33	14.12	14.02	13.96	14.16
H2-SL/8																		
8-1	10.90	14.20	9.42	14.49	9.38	14.12	10.60	13.90	10.85	13.91	11.64	14.11	14.02	14.08	13.71	13.68	13.73	14.05
8-2	10.90	14.20	9.98	14.47	9.90	13.96	11.20	13.60	10.94	13.75	11.76	14.19	14.02	14.15	13.63	13.48	13.59	14.15
8-3	10.90	14.20	10.13	14.62	10.05	14.16	11.20	13.80	11.62	13.74	11.55	14.20	14.02	14.32	13.85	13.68	13.68	14.13
8-4	10.90	14.20	9.20	14.58	9.15	14.12	10.50	13.70	10.56	13.98	11.61	13.93	14.02	14.13	13.68	13.47	13.66	13.87
SL/8-MEAN	10.90	14.20	9.68	14.54	9.62	14.09	10.38	13.75	10.99	13.82	11.64	14.11	14.02	14.17	13.72	13.58	13.66	14.05
H2-MEAN													14.42	14.49	14.14	14.13	14.17	14.13

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
H4-SL/2																		
2-6	10.90	14.60	9.91	14.99	9.60	14.72	11.30	14.20	11.29	14.41	11.25	13.85	14.42	14.64	14.33	14.09	14.29	13.73
SL/2-MEAN	10.90	14.60	9.91	14.99	9.60	14.72	11.30	14.20	11.29	14.41	11.25	13.85	14.42	14.64	14.33	14.09	14.29	13.73
H4-SL/7																		
7-1	10.40	14.30	9.99	14.62	9.76	14.31	11.20	14.20	10.96	14.02	10.65	13.85	14.04	14.29	13.95	14.07	13.86	13.64
7-2	10.40	14.30	9.89	14.75	9.60	14.39	10.90	13.90	9.89	14.29	10.79	13.92	14.04	14.40	14.01	13.73	13.96	13.73
7-3	10.40	14.30	9.57	14.48	9.34	14.10	10.70	13.60	10.76	13.96	10.60	14.04	14.04	14.09	13.69	13.40	13.77	13.82
7-4	10.40	14.30	9.56	14.76	9.34	14.37	11.10	13.70	10.96	13.71	10.57	13.94	14.04	14.36	13.95	13.56	13.55	13.72
7-5	10.40	14.30	9.82	14.46	9.75	14.02	10.90	13.70	9.98	13.92	10.90	13.93	14.04	14.11	13.67	13.53	13.61	13.76
7-6	10.40	14.30	9.58	14.63	9.52	14.12	10.80	13.80	10.97	13.69	11.22	13.85	14.04	14.24	13.73	13.61	13.53	13.73
SL/7-MEAN	10.40	14.30	9.74	14.62	9.55	14.22	10.93	13.82	10.59	13.93	10.79	13.92	14.04	14.25	13.83	13.65	13.71	13.73
H4-SL/8																		
8-1	10.90	14.20	9.42	14.49	9.38	14.12	10.60	13.90	10.85	13.91	11.33	13.86	14.02	14.08	13.71	13.68	13.73	13.76
8-5	10.90	14.20	9.39	14.37	9.32	14.05	10.60	13.80	10.94	13.75	11.33	13.86	14.02	13.96	13.63	13.58	13.59	13.76
SL/8-MEAN	10.90	14.20	9.41	14.43	9.35	14.09	10.60	13.85	10.90	13.83	11.33	13.86	14.02	14.02	13.67	13.63	13.66	13.76

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #													12% m.b.					
	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
H4-SL/9																		
9-1	10.90	14.30	9.09	14.50	9.02	14.26	10.40	13.70	10.08	13.81	11.09	13.88	14.12	14.04	13.79	13.46	13.52	13.74
9-2	10.90	14.30	9.26	14.52	9.16	14.26	10.60	13.50	10.65	13.76	11.08	13.87	14.12	14.08	13.81	13.29	13.55	13.73
9-3	10.90	14.30	9.22	14.49	9.16	14.11	10.30	13.50	10.94	13.82	11.00	13.81	14.12	14.05	13.67	13.24	13.66	13.65
9-4	10.90	14.30	9.05	14.66	9.06	14.24	10.60	13.70	10.77	13.94	11.09	13.85	14.12	14.18	13.78	13.49	13.75	13.71
9-5	10.90	14.30	9.56	15.08	9.52	14.04	11.30	14.40	11.21	14.32	11.16	13.85	14.12	14.67	13.66	14.29	14.19	13.72
9-6	10.90	14.30	9.69	15.38	9.69	15.08	11.50	14.50	10.92	14.40	11.14	13.86	14.12	14.99	14.69	14.42	14.23	13.73
SL/9-MEAN	10.90	14.30	9.31	14.77	9.27	14.33	10.78	13.88	10.76	14.01	11.09	13.85	14.12	14.33	13.90	13.69	13.81	13.71
H4-SL/10																		
10-1	11.60	14.20	9.94	14.42	9.80	14.16	11.40	13.60	11.64	13.60	11.25	13.85	14.14	14.09	13.81	13.51	13.54	13.73
10-2	11.60	14.20	9.88	14.92	9.82	14.66	11.80	14.30	11.41	14.00	11.25	13.85	14.14	14.57	14.31	14.27	13.91	13.73
SL/10-MEAN	11.60	14.20	9.91	14.67	9.81	14.41	11.60	13.95	11.53	13.80	11.25	13.85	14.14	14.33	14.06	13.89	13.73	13.73
H4-MEAN													14.06	14.05	13.89	13.72	13.81	13.72
L5-SL/1																		
1-1	10.60	14.50	10.26	14.56	10.02	14.45	11.40	13.40	11.00	13.90	11.40	13.80	14.27	14.28	14.13	13.31	13.74	13.71

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TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
1-2	10.60	14.50	10.26	14.47	10.00	14.38	11.50	13.70	10.90	14.00	11.25	13.85	14.27	14.19	14.06	13.62	13.83	13.73
1-3	10.60	14.50	10.22	14.49	9.98	14.36	11.40	13.90	10.80	13.80	11.20	13.90	14.27	14.20	14.04	13.81	13.61	13.77
1-4	10.60	14.50	10.31	14.42	10.00	14.46	11.60	13.70	10.80	13.80	10.90	13.90	14.27	14.15	14.14	13.64	13.61	13.73
1-5	10.60	14.50	10.08	14.40	9.82	14.29	11.40	13.90	10.90	13.70	11.10	13.80	14.27	14.09	13.94	13.81	13.53	13.66
SL/1-MEAN	10.60	14.50	10.23	14.47	9.96	14.39	11.46	13.72	10.88	13.84	11.17	13.85	14.27	14.18	14.06	13.64	13.67	13.72
L5-SL2																		
2-1	10.80	14.40	10.18	14.54	9.97	14.37	11.50	13.70	11.00	14.00	11.20	14.10	14.21	14.25	14.05	13.62	13.84	13.97
2-2	10.80	14.40	10.18	14.44	9.98	14.22	11.60	13.50	10.90	14.10	11.35	13.75	14.21	14.15	13.90	13.44	13.93	13.65
2-3	10.80	14.40	10.15	14.27	9.94	14.34	11.40	13.50	10.80	13.90	11.45	13.85	14.21	13.98	14.01	13.41	13.71	13.76
2-4	10.80	14.40	10.13	14.53	9.94	14.50	11.40	13.60	11.00	13.80	11.50	14.10	14.21	14.23	14.17	13.51	13.64	14.02
2-5	10.80	14.40	10.13	14.30	9.89	14.18	11.50	13.80	11.00	13.80	11.40	13.80	14.21	14.00	13.85	13.72	13.64	13.71
SL/2-MEAN	10.80	14.40	10.15	14.42	9.94	14.32	11.48	13.62	10.94	13.92	11.38	13.92	14.21	14.12	14.00	13.54	13.75	13.82
L5-SL/3																		
3-1	11.00	14.40	10.36	14.29	10.10	14.09	11.70	13.10	11.10	13.80	11.40	14.00	14.24	14.03	13.79	13.06	13.66	13.91
3-2	11.00	14.40	10.47	14.45	10.15	14.34	11.70	13.90	11.00	14.00	11.30	13.90	14.24	14.20	14.04	13.85	13.84	13.79
3-4	11.00	14.40	10.37	14.46	10.02	14.26	11.40	13.80	11.10	14.00	11.25	13.90	14.24	14.20	13.95	13.71	13.86	13.78
SL/3-MEAN	11.00	14.40	10.40	14.40	10.09	14.23	11.60	13.60	11.07	13.93	11.32	13.93	14.24	14.14	13.93	13.54	13.79	13.83

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				12% m.b. ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	O	K-J	O	K-J	O	K-J:E	O	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
L5-MEAN													14.24	14.15	14.01	13.58	13.75	13.78
L5-SL/4																		
4-1	10.90	14.90	10.34	14.27	10.00	14.26	11.40	14.00	10.94	13.90	13.54	14.00	14.72	14.01	13.94	13.91	13.73	14.25
4-2	10.90	14.90	10.35	14.20	10.02	14.33	11.60	13.70	10.90	14.10	13.57	14.10	14.72	13.94	14.01	13.64	13.93	14.36
4-3	10.90	14.90	10.29	14.57	9.96	14.12	11.70	13.70	11.10	14.20	13.50	14.00	14.72	14.29	13.80	13.65	14.06	14.24
4-4	10.90	14.90	10.20	14.52	9.88	14.56	11.40	14.20	10.90	14.20	11.10	13.90	14.72	14.23	14.22	14.10	14.02	13.76
4-5	10.90	14.90	10.37	14.75	10.02	14.78	11.70	14.00	10.90	14.20	11.15	14.00	14.72	14.48	14.45	13.95	14.02	13.87
SL/4-MEAN	10.90	14.90	10.31	14.46	9.98	14.41	11.56	13.92	10.95	14.12	12.57	14.00	14.72	14.19	14.09	13.85	13.95	14.09
L5-SL/3																		
3-3	11.00	14.40	10.44	14.39	10.16	14.20	11.70	13.60	11.02	13.70	10.99	14.05	14.24	14.14	13.91	13.55	13.55	13.89
3-5	11.00	14.40	10.32	14.36	9.94	14.44	11.30	14.00	10.96	14.00	10.99	14.05	14.24	14.09	14.11	13.89	13.84	13.89
SL/3-MEAN	11.00	14.40	10.38	14.38	10.05	14.32	11.50	13.80	10.99	13.85	10.99	14.05	14.24	14.12	14.01	13.72	13.69	13.89
L5-MEAN													14.58	14.17	14.07	13.81	13.88	14.03

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

																	12% m.b.		
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIP	NIR	NIR	O	K-J	O	K-J	O	K-J:E	O	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
LB-H5																		
SL/1																		
1-1	11.00	14.90	9.86	15.51	9.82	15.10	11.10	14.40	10.44	14.86	10.88	15.09	14.73	15.14	14.73	14.25	14.60	14.90
1-2	11.00	14.90	9.86	15.24	9.88	14.82	11.50	14.60	10.77	14.67	10.82	15.05	14.73	14.88	14.47	14.52	14.47	14.85
1-3	11.00	14.90	9.88	15.35	9.82	15.09	11.30	14.50	10.61	15.07	10.76	15.01	14.73	14.99	14.73	14.39	14.84	14.80
1-4	11.00	14.90	9.95	15.12	9.90	15.04	11.50	14.90	10.62	14.45	10.80	14.97	14.73	14.78	14.69	14.82	14.23	14.77
1-5	11.00	14.90	9.93	15.26	9.88	14.96	11.50	14.70	10.66	14.78	10.80	14.94	14.73	14.91	14.61	14.62	14.56	14.74
SL/1-MEAN	11.00	14.90	9.90	15.30	9.86	15.00	11.38	14.62	10.62	14.77	10.81	15.01	14.73	14.94	14.65	14.52	14.54	14.81
SL/2																		
2-1	11.10	15.00	10.65	14.80	10.43	14.79	11.50	14.60	10.84	14.88	10.74	15.04	14.85	14.58	14.53	14.52	14.69	14.83
2-2	11.10	15.00	10.51	14.87	10.32	14.80	11.70	14.50	10.84	14.77	10.67	15.14	14.85	14.62	14.52	14.45	14.58	14.91
2-3	11.10	15.00	10.52	14.99	10.33	14.92	11.60	14.50	10.89	14.67	10.81	14.54	14.85	14.74	14.64	14.43	14.49	14.35
2-4	11.10	15.00	10.40	14.94	10.22	14.79	11.70	14.40	10.70	14.80	10.92	14.54	14.85	14.67	14.50	14.35	14.58	14.36
2-5	11.10	15.00	10.40	15.01	10.25	14.92	11.70	14.70	10.86	15.00	10.91	14.60	14.85	14.74	14.63	14.65	14.81	14.42
SL/2-MEAN	11.10	15.00	10.50	14.92	10.31	14.84	11.64	14.54	10.83	14.82	10.81	14.77	14.85	14.67	14.56	14.48	14.63	14.57
SL/3																		
3-1	10.80	15.10	10.20	14.83	9.86	15.06	11.60	14.60	10.95	14.92	10.90	14.65	14.90	14.53	14.70	14.53	14.74	14.47

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				12% m.b.					
													ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
3-2	10.80	15.10	10.26	14.93	9.97	15.17	11.70	14.90	10.84	14.71	11.14	14.89	14.90	14.64	14.83	14.85	14.52	14.75
3-3	10.80	15.10	10.30	14.88	10.04	15.24	11.60	14.60	10.78	14.60	11.05	14.91	14.90	14.60	14.91	14.53	14.40	14.75
3-4	10.80	15.10	10.47	14.91	10.25	14.58	11.50	14.60	10.66	15.17	11.14	15.03	14.90	14.66	14.30	14.52	14.94	14.88
3-5	10.80	15.10	10.32	15.03	10.10	14.83	11.50	14.30	10.79	14.79	10.95	14.78	14.90	14.75	14.52	14.22	14.59	14.61
SL/3-MEAN	10.80	15.10	10.31	14.92	10.04	14.98	11.58	14.60	10.80	14.84	11.04	14.85	14.90	14.63	14.65	14.53	14.64	14.69
H5-MEAN													14.83	14.75	14.62	14.51	14.60	14.69
L8-H5																		
4-1	10.20	15.00	10.06	15.34	9.96	14.81	11.40	14.60	10.53	14.54	11.13	14.60	14.70	15.01	14.47	14.50	14.30	14.46
4-2	10.20	15.00	10.01	15.31	9.98	15.08	11.50	14.40	10.90	14.52	11.38	14.52	14.70	14.97	14.74	14.32	14.34	14.42
4-3	10.20	15.00	10.00	15.09	9.88	14.72	11.20	14.30	10.80	14.69	11.60	14.76	14.70	14.75	14.37	14.17	14.49	14.69
4-4	10.20	15.00	9.89	15.08	9.80	14.68	11.40	14.10	10.85	14.74	11.05	14.69	14.70	14.73	14.32	14.00	14.55	14.53
4-5	10.20	15.00	9.71	15.06	9.68	14.66	11.40	14.70	10.95	14.60	10.66	14.91	14.70	14.68	14.28	14.60	14.43	14.69
SL/4-MEAN	10.20	15.00	9.93	15.18	9.86	14.79	11.38	14.42	10.81	14.62	11.16	14.70	14.70	14.83	14.44	14.32	14.42	14.56
SL/5																		
5-1	10.40	15.00	9.83	15.16	9.84	14.80	11.30	14.30	10.65	14.58	11.10	14.81	14.73	14.80	14.45	14.19	14.36	14.66

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
5-2	10.40	15.00	9.91	15.14	9.79	14.88	11.30	14.60	10.60	14.78	10.87	14.71	14.73	14.79	14.52	14.48	14.55	14.52
5-3	10.40	15.00	10.05	15.32	9.96	15.08	11.70	14.60	10.85	14.68	11.01	14.79	14.73	14.99	14.74	14.55	14.49	14.63
5-4	10.40	15.00	10.12	15.19	9.96	15.10	11.80	14.60	10.55	15.03	10.98	14.97	14.73	14.87	14.76	14.57	14.79	14.80
5-5	10.40	15.00	9.88	15.17	9.88	14.68	11.50	13.90	10.65	14.44	11.08	14.89	14.73	14.81	14.33	13.82	14.22	14.74
SL/5-MEAN	10.40	15.00	9.96	15.20	9.89	14.91	11.52	14.40	10.66	14.70	11.01	14.83	14.73	14.85	14.56	14.32	14.48	14.67
H3-MEAN													14.75	14.84	14.50	14.32	14.46	14.62
H1-SL/9																		
9-10	11.60	14.40	10.73	14.35	10.61	14.08	12.20	13.60	11.70	13.68	11.70	13.58	14.33	14.15	13.86	13.63	13.63	13.53
SL/9-MEAN	11.60	14.40											14.33	14.15	13.86	13.63	13.63	13.53
H1-SL/10																		
10-1	11.10	14.40	10.81	14.23	10.66	14.06	12.20	13.70	11.80	13.68	11.70	13.72	14.25	14.04	13.85	13.73	13.65	13.67
10-2	11.10	14.40	10.32	13.86	10.21	13.48	12.00	13.40	11.40	13.12	11.00	13.74	14.25	13.60	13.21	13.40	13.03	13.59
10-3	11.10	14.40	9.81	14.55	9.70	14.32	11.00	13.70	11.10	13.68	11.00	13.84	14.25	14.20	13.96	13.55	13.54	13.68
10-4	11.10	14.40	9.63	15.00	9.68	14.46	10.90	14.00	11.20	14.03	11.40	13.69	14.25	14.61	14.09	13.83	13.90	13.60
10-5	11.10	14.40	9.90	14.94	9.93	14.45	11.10	14.10	11.60	13.78	11.53	13.71	14.25	14.59	14.12	13.96	13.72	13.64
10-6	11.10	14.40	9.85	14.90	9.84	14.43	11.60	13.50	11.20	13.73	11.53	13.71	14.25	14.54	14.08	13.44	13.61	13.64

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	HM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
10-7	11.10	14.40	9.83	14.76	9.82	14.32	11.40	13.80	11.20	13.65	11.60	13.78	14.25	14.40	13.97	13.71	13.53	13.72
10-8	11.10	14.40	10.21	14.47	10.24	14.08	12.20	13.50	11.90	13.60	12.00	13.59	14.25	14.18	13.80	13.53	13.58	13.59
10-9	11.10	14.40	9.87	14.81	9.98	14.26	11.60	13.80	11.30	13.63	12.00	13.58	14.25	14.46	13.94	13.74	13.52	13.58
10-10	11.10	14.40	9.74	14.51	9.78	14.06	11.30	13.50	10.90	13.63	11.53	13.71	14.25	14.15	13.71	13.39	13.46	13.64
SL/10-MEAN	11.10	14.40	10.00	14.60	9.98	14.19	11.53	13.70	11.36	13.65	11.53	13.71	14.25	14.28	13.87	13.63	13.55	13.63
H1-MEAN	10.90	14.50											14.30	14.24	13.85	13.65	13.60	13.65
H3-SL/7																		
7-4	10.70	14.40	10.09	14.51	9.85	14.34	11.30	13.70	11.10	13.82	11.70	13.65	14.19	14.20	14.00	13.59	13.68	13.60
7-5	10.70	14.40	10.00	14.43	9.80	14.17	11.00	13.70	11.20	13.74	11.35	13.72	14.19	14.11	13.82	13.55	13.62	13.62
7-6	10.70	14.40	10.04	14.32	9.88	14.03	10.70	13.80	11.10	13.89	11.00	13.84	14.19	14.01	13.70	13.60	13.75	13.68
7-7	10.70	14.40	9.93	14.25	9.76	14.07	10.70	13.50	11.30	13.74	11.00	13.74	14.19	13.92	13.72	13.30	13.63	13.59
7-8	10.70	14.40	10.44	14.37	10.30	13.95	10.70	13.50	11.30	13.74	11.00	13.79	14.19	14.12	13.69	13.30	13.63	13.64
7-9	10.70	14.40	10.18	14.58	10.10	14.01	10.90	13.60	11.10	13.72	11.40	13.68	14.19	14.28	13.71	13.43	13.58	13.59
7-10	10.70	14.40	9.91	14.56	9.84	14.05	10.90	13.90	10.90	13.84	11.40	13.70	14.19	14.22	13.71	13.73	13.67	13.61
SL7-MEAN	10.70	14.40											14.19	14.12	13.76	13.50	13.65	13.62

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				12% m.b. ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
H3-SL/8																		
8-6	11.20	14.70	10.10	14.79	10.06	14.46	10.90	13.90	11.60	13.93	11.60	13.80	14.57	14.48	14.15	13.73	13.87	13.74
8-7	11.20	14.70	10.27	14.74	10.25	14.40	11.70	14.00	11.90	13.94	11.60	13.77	14.57	14.46	14.12	13.95	13.92	13.71
8-8	11.20	14.70	10.56	14.83	10.44	14.38	12.10	14.00	12.00	13.88	13.00	13.59	14.57	14.59	14.13	14.02	13.88	13.75
8-9	11.20	14.70	10.42	14.61	10.36	14.30	12.10	13.80	12.00	13.85	13.00	13.58	14.57	14.35	14.04	13.82	13.85	13.74
8-10	11.20	14.70	10.42	14.69	14.69	14.38	12.20	13.90	11.80	13.89	12.00	13.59	14.57	14.43	14.83	13.93	13.86	13.59
SL/8-MEAN	11.20	14.70	10.35	14.73	11.16	14.38	11.80	13.92	11.86	13.90	12.24	13.67	14.57	14.46	14.25	13.89	13.88	13.70
H3-MEAN	10.90	14.50											14.33	14.08	13.99	13.49	13.76	13.73
H1-SL/1																		
1-1	10.70	14.50	9.49	14.45	9.48	14.26	11.40	13.40	11.00	13.70	11.20	13.71	14.29	14.05	13.86	13.31	13.55	13.59
1-2	10.70	14.50	9.68	14.74	9.63	14.44	11.20	14.10	11.00	13.80	11.20	13.66	14.29	14.36	14.06	13.97	13.64	13.54
1-3	10.70	14.50	9.48	14.53	9.47	14.18	11.40	13.80	11.20	13.70	11.20	13.66	14.29	14.13	13.78	13.71	13.58	13.54
1-4	10.70	14.50	9.59	14.43	9.62	13.90	11.60	13.60	11.10	13.70	11.20	13.71	14.29	14.05	13.53	13.54	13.56	13.59
1-5	10.70	14.50	9.73	14.58	9.70	14.00	11.30	13.70	11.10	13.80	11.20	13.71	14.29	14.21	13.64	13.59	13.66	13.59
1-6	10.70	14.50	9.52	14.50	9.58	13.94	11.60	13.80	11.30	13.70	10.80	13.66	14.29	14.10	13.57	13.74	13.59	13.48
1-7	10.70	14.50	10.04	14.51	9.95	13.87	11.40	13.60	11.10	13.70	10.80	13.66	14.29	14.19	13.55	13.51	13.56	13.48

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TABLE IV SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #													12% m.b.					
	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDO
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
1-8	10.70	14.50	9.82	14.37	9.72	13.81	11.50	14.00	11.00	13.80	11.10	13.69	14.29	14.02	13.46	13.92	13.64	13.55
1-9	10.70	14.50	9.83	14.38	9.74	13.76	11.00	13.60	11.20	13.60	11.30	13.80	14.29	14.03	13.42	13.45	13.48	13.69
1-10	10.70	14.50	9.75	14.49	9.68	14.04	11.10	13.40	11.40	13.60	11.00	13.80	14.29	14.13	13.68	13.26	13.51	13.64
SL/1-MEAN	10.70	14.50	9.69	14.50	9.66	14.02	11.35	13.70	11.14	13.71	11.10	13.71	14.29	14.13	13.66	13.60	13.58	13.57
H1-SL/2																		
2-1	10.70	14.40	9.85	14.47	9.76	14.28	11.20	13.30	11.00	13.61	11.00	13.71	14.19	14.12	13.93	13.18	13.46	13.56
2-2	10.70	14.40	9.74	14.41	9.72	14.12	10.90	13.50	11.00	13.79	11.40	13.63	14.19	14.05	13.76	13.33	13.64	13.54
2-3	10.70	14.40	9.81	14.26	9.74	13.94	11.10	13.40	11.10	13.81	11.40	13.63	14.19	13.91	13.59	13.26	13.67	13.54
2-4	10.70	14.40	9.77	14.31	9.80	13.94	11.10	13.90	11.10	13.64	11.40	13.68	14.19	13.96	13.60	13.76	13.50	13.59
2-5	10.70	14.40	9.74	14.59	9.71	14.22	11.50	13.60	11.00	13.61	11.10	13.68	14.19	14.22	13.86	13.52	13.46	13.54
2-6	10.70	14.40	9.66	14.44	9.69	14.10	11.10	13.70	10.80	13.56	11.20	13.64	14.19	14.07	13.74	13.56	13.38	13.52
2-7	10.70	14.40	9.57	14.31	9.58	13.94	11.30	13.50	11.20	13.69	11.40	13.64	14.19	13.93	13.57	13.39	13.57	13.55
2-8	10.70	14.40	9.43	14.62	9.50	14.03	11.40	13.80	10.90	13.61	11.40	13.64	14.19	14.21	13.64	13.71	13.44	13.55
2-9	10.70	14.40	9.61	14.51	9.60	14.20	11.60	13.20	11.10	13.76	11.30	13.89	14.19	14.13	13.82	13.14	13.62	13.78
SL/2-MEAN	10.70	14.40	9.69	14.44	9.68	14.09	11.24	13.54	11.02	13.68	11.29	13.68	14.19	14.07	13.72	13.43	13.53	13.57
H1-SL/8																		
8-1	11.20	14.70	10.15	14.65	10.06	14.08	11.20	14.00	11.50	13.89	11.30	13.89	14.57	14.35	13.78	13.87	13.81	13.78
8-2	11.20	14.70	10.06	14.83	10.04	14.37	11.30	14.00	11.20	13.99	11.40	14.14	14.57	14.51	14.06	13.89	13.86	14.04

03-Feb-88

TABLE IV SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				12% m.b. ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	O	K-J	O	K-J	O	K-J:E	O	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
8-3	11.20	14.70	10.06	14.79	10.02	14.46	11.30	14.10	11.00	13.89	11.30	13.69	14.57	14.47	14.14	13.98	13.73	13.58
8-4	11.20	14.70	10.08	14.83	10.05	14.38	11.40	13.80	11.10	13.69	11.30	13.69	14.57	14.51	14.07	13.71	13.55	13.58
8-5	11.20	14.70	10.21	14.69	10.12	14.18	11.30	14.10	11.50	13.90	11.30	13.79	14.57	14.40	13.88	13.98	13.82	13.88
SL/8-MEAN	11.20	14.70	10.11	14.76	10.06	14.29	11.30	14.00	11.26	13.87	11.32	13.84	14.57	14.45	13.99	13.89	13.76	13.73
H1-SL/9																		
9-1	11.60	14.40	10.34	14.71	10.34	14.39	11.60	14.00	11.60	13.86	11.00	13.74	14.33	14.44	14.12	13.94	13.80	13.50
9-2	11.60	14.40	10.44	14.73	10.36	14.51	11.50	13.50	11.80	13.81	11.00	13.76	14.33	14.47	14.24	13.42	13.78	13.61
9-3	11.60	14.40	10.40	14.85	10.36	14.62	12.00	13.80	11.40	13.81	11.40	13.91	14.33	14.58	14.35	13.80	13.72	13.82
9-4	11.60	14.40	10.20	14.90	10.23	14.56	12.10	13.90	11.80	13.76	11.40	13.91	14.33	14.60	14.27	13.92	13.73	13.82
9-5	11.60	14.40	10.30	14.57	10.28	14.20	11.80	14.10	11.90	13.56	11.50	13.94	14.33	14.29	13.93	14.07	13.54	13.86
9-6	11.60	14.40	10.44	14.75	10.36	14.35	12.20	14.00	11.80	13.81	11.30	13.98	14.33	14.49	14.09	14.03	13.78	13.87
9-7	11.60	14.40	11.02	14.24	10.90	13.97	12.10	13.80	11.90	13.66	11.30	13.98	14.33	14.08	13.80	13.82	13.64	13.87
9-8	11.60	14.40	10.76	14.66	10.64	14.38	12.40	14.00	11.80	13.61	11.70	14.02	14.33	14.46	14.16	14.06	13.58	13.97
9-9	11.60	14.40	10.80	14.53	10.55	14.44	12.00	13.60	12.00	13.71	11.70	14.02	14.33	14.33	14.21	13.60	13.71	13.97
SL/9-MEAN																		
H1-MEAN	10.90	14.50											14.30	14.24	13.86	13.65	13.61	13.70

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				12% m.b. ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	O	K-J	O	K-J	O	K-J:E	O	K-J:D	MPE	HPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
H3-SL/3																		
3-1	10.60	14.50	9.61	14.35	9.66	14.10	11.40	13.20	10.90	13.61	11.10	13.78	14.27	13.97	13.73	13.11	13.44	13.64
3-2	10.60	14.50	9.74	14.51	9.71	14.30	11.20	13.00	10.90	13.66	11.10	13.78	14.27	14.15	13.94	12.88	13.49	13.64
3-3	10.60	14.50	9.57	14.40	9.59	13.95	11.30	13.60	10.90	13.61	11.10	13.81	14.27	14.01	13.58	13.49	13.44	13.67
3-4	10.60	14.50	9.58	14.40	9.58	14.06	11.30	13.30	10.90	13.66	11.10	13.81	14.27	14.01	13.68	13.20	13.49	13.67
3-5	10.60	14.50	9.58	14.39	9.64	14.06	11.30	13.50	10.90	13.60	11.10	13.81	14.27	14.00	13.69	13.39	13.43	13.67
3-6	10.60	14.50	9.60	14.43	9.62	14.14	11.30	13.60	10.90	13.66	11.30	13.69	14.27	14.05	13.77	13.49	13.49	13.58
3-7	10.60	14.50	9.75	14.27	9.51	13.98	11.00	13.50	10.90	13.61	11.30	13.69	14.27	13.91	13.60	13.35	13.44	13.58
3-8	10.60	14.50	9.77	14.27	9.52	14.14	11.30	13.50	11.00	13.61	11.00	13.64	14.27	13.92	13.75	13.39	13.46	13.49
3-9	10.60	14.50	9.77	14.13	9.64	14.10	11.10	13.40	11.20	13.61	11.00	13.64	14.27	13.78	13.73	13.26	13.49	13.49
3-10	10.60	14.50	9.81	14.21	9.66	13.95	11.30	13.50	11.00	13.65	10.90	13.69	14.27	13.86	13.59	13.39	13.50	13.52
SL/3-MEAN	10.60	14.50	9.68	14.34	9.61	14.08	11.25	13.41	10.95	13.63	11.10	13.73	14.27	13.97	13.71	13.30	13.47	13.59
H3-SL/4																		
4-1	10.80	14.50	9.98	14.57	9.78	14.23	11.20	13.40	11.10	14.00	10.90	13.69	14.30	14.24	13.88	13.28	13.86	13.52
4-2	10.80	14.50	9.77	14.46	9.59	14.20	11.30	13.40	11.10	13.80	10.90	13.69	14.30	14.10	13.82	13.29	13.66	13.52
4-3	10.80	14.50	9.90	14.16	9.78	14.06	11.10	13.40	11.00	13.70	11.20	13.64	14.30	13.83	13.71	13.26	13.55	13.52
4-4	10.80	14.50	10.02	14.25	9.85	14.02	11.60	13.80	11.00	13.71	11.20	13.64	14.30	13.94	13.69	13.74	13.56	13.52
4-5	10.80	14.50	9.99	14.17	9.22	13.96	11.50	13.50	11.20	13.60	11.20	13.64	14.30	13.85	13.53	13.42	13.48	13.52

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

													12% m.b.					
SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				ORIGIN	QC TB		ARS	DESTINATION	
	MM	NIR	NIR	NIR	0	K-J	0	K-J	0	K-J:E	0	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
4-6	10.80	14.50	9.97	14.43	9.78	14.16	11.10	13.50	11.20	13.69	11.20	13.64	14.30	14.10	13.81	13.36	13.57	13.52
4-7	10.80	14.50	9.96	14.27	9.78	14.16	11.60	13.20	11.00	13.76	11.10	13.74	14.30	13.95	13.81	13.14	13.61	13.60
4-8	10.80	14.50	10.07	14.46	9.87	14.14	11.50	13.30	10.90	13.84	11.10	13.74	14.30	14.15	13.81	13.22	13.67	13.60
4-9	10.80	14.50	9.95	14.15	9.80	14.08	11.60	13.50	11.10	13.68	11.10	14.04	14.30	13.83	13.74	13.44	13.54	13.90
4-10	10.80	14.50	9.87	14.62	9.71	14.39	11.00	13.80	10.90	13.79	11.10	14.04	14.30	14.27	14.03	13.64	13.62	13.96
SL/4-MEAN	10.80	14.50	9.95	14.35	9.72	14.14	11.35	13.48	11.05	13.76	11.10	13.75	14.30	14.03	13.78	13.38	13.61	13.61
H3-SL/5																		
5-1	10.60	14.60	9.94	14.33	9.74	14.14	10.90	13.70	10.80	13.70	11.10	14.04	14.37	14.00	13.79	13.53	13.52	13.90
5-2	10.60	14.60	9.93	14.20	9.76	13.74	11.30	13.20	10.80	13.60	11.40	13.71	14.37	13.87	13.40	13.10	13.42	13.62
5-3	10.60	14.60	10.06	14.45	9.90	14.26	10.80	13.30	10.80	13.80	11.40	13.71	14.37	14.14	13.93	13.12	13.61	13.62
5-4	10.60	14.60	10.01	14.55	9.84	14.26	11.60	13.90	11.10	13.70	11.00	13.86	14.37	14.23	13.92	13.84	13.56	13.70
5-5	10.60	14.60	10.01	14.43	9.88	14.22	10.80	13.50	10.90	13.70	11.00	13.86	14.37	14.11	13.89	13.32	13.53	13.70
5-6	10.60	14.60	10.09	14.45	9.94	14.44	11.50	13.80	11.50	13.80	11.00	13.79	14.37	14.14	14.11	13.72	13.72	13.64
5-7	10.60	14.60	10.47	14.49	10.25	14.34	11.40	13.70	11.00	13.80	11.00	13.79	14.37	14.24	14.06	13.61	13.64	13.64
5-8	10.60	14.60	10.31	14.50	10.07	14.34	11.50	13.60	10.80	14.00	11.20	13.86	14.37	14.23	14.03	13.52	13.81	13.74
5-9	10.60	14.60	10.21	14.33	9.96	14.30	11.20	14.00	11.20	13.70	11.20	13.86	14.37	14.04	13.98	13.87	13.58	13.74
SL/5-MEAN	10.60	14.60	10.11	14.41	9.93	14.23	11.22	13.63	10.99	13.76	11.14	13.83	14.37	14.11	13.90	13.51	13.60	13.70
H3-SL/6																		

TABLE IV - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	ORIGIN		QC TB				ARS		DESTINATION				12% m.b. ORIGIN	12% m.b. QC TB		12% m.b. ARS	12% m.b. DESTINATION	
	MM	NIR	NIR	NIR	O	K-J	O	K-J	O	K-J:E	O	K-J:D	NPE	NPK	KPK	KPA	KPDE	KPDD
	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%M	%P	%P	%P	%P	%P	%P	%P
6-1	10.80	14.60	10.06	14.28	9.85	14.18	11.00	14.00	10.90	13.64	11.20	13.86	14.40	13.97	13.84	13.84	13.47	13.74
6-2	10.80	14.60	10.06	14.27	9.84	14.00	11.40	13.60	10.90	13.69	11.20	13.81	14.40	13.96	13.66	13.51	13.52	13.69
6-3	10.80	14.60	10.09	14.29	9.88	14.22	11.20	13.60	11.10	13.69	11.20	13.81	14.40	13.99	13.89	13.48	13.55	13.69
6-4	10.80	14.60	10.07	14.17	9.82	13.99	11.50	13.90	11.20	13.69	11.10	13.92	14.40	13.87	13.85	13.82	13.57	13.78
6-5	10.80	14.60	11.03	14.30	9.82	14.08	10.90	13.70	10.70	13.64	11.10	13.92	14.40	14.14	13.74	13.53	13.44	13.78
6-6	10.80	14.60	9.95	14.22	9.16	14.00	11.30	13.60	10.60	13.88	10.90	13.77	14.40	13.90	13.56	13.49	13.48	13.80
6-7	10.80	14.60	9.94	14.37	9.76	14.20	10.90	13.50	10.70	13.69	10.90	13.77	14.40	14.04	13.85	13.33	13.49	13.80
6-8	10.80	14.60	10.04	14.36	9.79	14.03	11.10	14.00	10.60	13.64	11.10	13.80	14.40	14.05	13.89	13.86	13.43	13.66
6-9	10.80	14.60	9.93	14.45	9.74	14.12	11.30	13.70	10.60	13.79	11.10	13.80	14.40	14.12	13.77	13.59	13.57	13.66
6-10	10.80	14.60	10.04	14.45	9.03	14.09	11.30	13.40	10.40	13.69	11.20	13.84	14.40	14.14	13.75	13.29	13.45	13.72
SL/6-MEAN	10.80	14.60	10.12	14.32	9.75	14.09	11.19	13.70	10.77	13.69	11.10	13.83	14.40	14.02	13.74	13.58	13.50	13.69
H3-SL/7																		
7-1	10.70	14.40	10.02	14.43	9.74	14.28	11.20	13.40	11.00	13.70	11.20	13.84	14.19	14.11	13.92	13.28	13.55	13.72
7-2	10.70	14.40	10.07	14.31	9.86	14.02	11.40	13.40	11.10	13.80	11.40	13.79	14.19	14.00	13.89	13.31	13.66	13.70
SL/7-MEAN																		
H3-MEAN	10.90	14.50											14.30	14.08	13.81	13.49	13.58	13.86

KEY:

NPE = Origin-NIR protein or certified protein
NPK = QCL-NIR protein
KPK = QCL-Kjeldahl protein
KPA = ARS-Kjeldahl protein
KPDE = Destination-Kjedahl protein on origin samples
KPDD = Destination-Kjeldahl protein on destination samples
%M = Percent moisture
%P = Perecent protein
12% m.b. = 12 percent moisture basis

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
L2-SL/1	14.59	14.38	14.17	14.06	14.60	14.10	0.21	0.41	0.53	-0.01	0.49	0.20	0.32	-0.22	0.28	0.11	-0.43	0.08	-0.54	-0.04	0.50
L2-SL/2	14.42	14.21	13.94	13.83	14.21	14.23	0.21	0.48	0.59	0.21	0.19	0.27	0.38	0.00	-0.02	0.11	-0.26	-0.26	-0.38	-0.40	-0.02
L2-SL/3	14.57	14.45	14.12	14.01	13.95	14.14	0.12	0.45	0.56	0.62	0.43	0.33	0.44	0.50	0.31	0.11	0.17	-0.02	0.06	-0.13	-0.19
L2-SL/4	14.43	14.09	13.93	13.82	14.04	14.10	0.33	0.50	0.61	0.39	0.33	0.17	0.27	0.05	0.00	0.11	-0.11	-0.17	-0.22	-0.28	-0.06
L2-MEAN	14.50	14.28	14.04	13.93	14.20	14.14	0.22	0.46	0.57	0.30	0.36	0.24	0.35	0.08	0.14	0.11	-0.16	-0.10	-0.27	-0.21	0.06
L1-SL/1	14.52	14.41	14.36	14.25	14.15	14.15	0.12	0.17	0.27	0.38	0.38	0.05	0.16	0.26	0.26	0.11	0.21	0.21	0.10	0.10	0.00
L1-SL/2	14.87	14.46	14.28	14.17	14.23	14.16	0.42	0.59	0.70	0.64	0.71	0.17	0.29	0.22	0.29	0.11	0.05	0.12	-0.06	0.01	0.07
L1-SL/3	14.80	14.34	14.26	14.15	14.05	14.11	0.46	0.54	0.65	0.75	0.69	0.08	0.19	0.29	0.23	0.11	0.21	0.15	0.10	0.04	-0.06
L1-MEAN	14.73	14.40	14.30	14.19	14.14	14.14	0.33	0.43	0.54	0.59	0.59	0.10	0.21	0.26	0.26	0.11	0.16	0.16	0.05	0.05	0.00
H2-SL/1																					
1-1	14.42	14.44	14.42	14.68	14.26	14.39	-0.03	0.00	-0.27	0.16	0.03	0.03	-0.24	0.18	0.06	-0.27	0.16	0.03	0.42	0.30	-0.13
1-2	14.42	15.08	14.89	14.70	14.41	14.57	-0.66	-0.47	-0.28	0.01	-0.16	0.19	0.38	0.67	0.50	0.19	0.48	0.31	0.29	0.13	-0.16
1-3	14.42	14.74	14.48	14.58	14.09	14.47	-0.32	-0.06	-0.17	0.33	-0.06	0.26	0.16	0.65	0.27	-0.10	0.39	0.01	0.49	0.11	-0.38
1-4	14.42	14.71	14.56	14.23	14.32	14.46	-0.30	-0.15	0.19	0.10	-0.04	0.15	0.48	0.39	0.25	0.34	0.24	0.11	-0.09	-0.23	-0.14
1-5	14.42	14.51	14.35	14.26	14.19	14.10	-0.09	0.07	0.15	0.23	0.32	0.16	0.25	0.32	0.41	0.08	0.16	0.25	0.07	0.16	0.09
1-6	14.42	14.67	14.56	14.52	14.22	14.22	-0.25	-0.15	-0.10	0.20	0.19	0.11	0.15	0.45	0.44	0.05	0.34	0.34	0.30	0.29	0.00
SL/1-MEAN	14.42	14.69	14.54	14.50	14.25	14.37	-0.28	-0.13	-0.08	0.17	0.05	0.15	0.20	0.44	0.32	0.05	0.29	0.17	0.25	0.13	-0.12

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #	12% m.b.						DIFFERENCES														
	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDD	NPK	KPK	KPA	KPDE	KPDD	KPK	KPA	KPDE	KPDD	KPA	KPDE	KPDD	KPDE	KPDD	KPDD
	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P
H2-SL/2																					
2-1	14.45	14.22	14.03	14.18	13.80	14.27	0.23	0.43	0.27	0.65	0.19	0.20	0.04	0.42	-0.05	-0.16	0.23	-0.24	0.38	-0.08	-0.47
2-2	14.45	14.11	14.03	13.72	13.82	13.91	0.34	0.42	0.74	0.63	0.54	0.08	0.40	0.29	0.20	0.32	0.21	0.12	-0.10	-0.19	-0.09
2-3	14.45	14.39	14.06	13.88	13.83	14.23	0.06	0.39	0.57	0.62	0.22	0.33	0.51	0.56	0.16	0.18	0.23	-0.17	0.05	-0.35	-0.40
2-4	14.45	14.70	14.25	14.00	13.93	14.12	-0.25	0.20	0.45	0.52	0.33	0.45	0.70	0.77	0.58	0.25	0.32	0.13	0.07	-0.12	-0.19
2-5	14.45	14.55	14.33	14.25	14.03	14.18	-0.10	0.12	0.20	0.42	0.28	0.22	0.30	0.52	0.37	0.08	0.30	0.16	0.22	0.08	-0.15
SL/2-MEAN	14.45	14.39	14.14	14.01	13.88	14.14	0.06	0.31	0.44	0.57	0.31	0.25	0.39	0.51	0.25	0.13	0.26	0.00	0.13	-0.13	-0.26
H2-SL/3																					
3-1	14.50	14.77	14.58	14.10	14.23	14.18	-0.27	-0.08	0.40	0.27	0.32	0.18	0.67	0.54	0.59	0.49	0.35	0.41	-0.13	-0.08	0.05
3-2	14.50	14.68	14.50	14.33	14.37	14.20	-0.18	0.00	0.17	0.13	0.30	0.18	0.35	0.31	0.48	0.17	0.13	0.31	-0.04	0.13	0.17
3-3	14.50	14.65	14.72	14.41	14.27	14.30	-0.15	-0.22	0.09	0.23	0.20	-0.07	0.24	0.38	0.36	0.31	0.45	0.43	0.14	0.12	-0.03
3-4	14.50	15.00	14.57	14.10	14.48	13.76	-0.50	-0.07	0.40	0.02	0.74	0.43	0.90	0.52	1.24	0.47	0.09	0.81	-0.38	0.34	0.72
3-5	14.50	14.91	14.44	14.32	14.43	14.14	-0.41	0.06	0.18	0.07	0.36	0.47	0.60	0.48	0.77	0.12	0.01	0.29	-0.11	0.17	0.29
3-6	14.50	14.82	14.47	14.15	14.10	14.09	-0.32	0.03	0.35	0.40	0.41	0.36	0.68	0.72	0.73	0.32	0.37	0.38	0.05	0.06	0.01
SL/3-MEAN	14.50	14.81	14.55	14.23	14.35	14.11	-0.31	-0.05	0.27	0.15	0.39	0.26	0.57	0.46	0.70	0.31	0.20	0.44	-0.12	0.12	0.24
H2-SL/4																					
4-1	14.32	14.27	14.02	14.17	13.95	14.21	0.05	0.30	0.15	0.37	0.11	0.26	0.10	0.32	0.07	-0.15	0.07	-0.19	0.22	-0.04	-0.26
4-2	14.32	14.31	13.97	14.09	13.86	13.98	0.01	0.35	0.23	0.46	0.34	0.34	0.22	0.45	0.33	-0.12	0.11	-0.01	0.23	0.11	-0.12
4-3	14.32	14.14	13.89	14.12	13.74	13.91	0.18	0.43	0.20	0.58	0.41	0.25	0.02	0.40	0.23	-0.24	0.14	-0.02	0.38	0.22	-0.16
4-4	14.32	14.30	13.89	13.87	13.81	14.02	0.02	0.43	0.45	0.51	0.30	0.41	0.43	0.49	0.29	0.02	0.08	-0.12	0.06	-0.14	-0.20
4-5	14.32	14.12	13.81	13.89	13.97	14.06	0.20	0.51	0.43	0.35	0.27	0.31	0.23	0.15	0.06	-0.08	-0.16	-0.25	-0.08	-0.17	-0.09
4-6	14.32	14.49	14.13	14.27	13.93	13.92	-0.17	0.19	0.05	0.39	0.41	0.36	0.22	0.56	0.58	-0.14	0.20	0.21	0.34	0.36	0.01
SL/4-MEAN	14.32	14.27	13.95	14.07	13.84	14.01	0.05	0.37	0.25	0.48	0.31	0.32	0.20	0.43	0.26	-0.12	0.11	-0.06	0.23	0.06	-0.17
H2-SL/5																					

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDD	NPK	KPK	KPA	KPDE	KPDD	KPK	KPA	KPDE	KPDD	KPA	KPDE	KPDD	KPDE	KPDD	KPDD
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
5-1	14.88	14.76	14.46	14.20	14.29	14.03	0.12	0.42	0.68	0.58	0.85	0.30	0.56	0.47	0.73	0.26	0.17	0.43	-0.09	0.17	0.26
5-2	14.98	14.83	14.46	14.73	14.35	14.06	0.05	0.42	0.15	0.53	0.82	0.37	0.10	0.48	0.77	-0.28	0.11	0.39	0.38	0.67	0.29
5-3	14.88	14.72	14.37	14.58	14.35	14.13	0.16	0.51	0.30	0.53	0.75	0.35	0.13	0.36	0.58	-0.22	0.01	0.23	0.23	0.45	0.22
5-4	14.88	14.77	14.31	14.52	14.41	14.00	0.11	0.57	0.36	0.47	0.88	0.47	0.26	0.36	0.77	-0.21	-0.10	0.30	0.11	0.51	0.41
5-5	14.88	14.67	14.60	14.40	14.46	14.06	0.21	0.28	0.48	0.42	0.82	0.07	0.27	0.21	0.61	0.20	0.14	0.54	-0.06	0.34	0.40
5-6	14.88	14.99	14.68	14.72	14.57	14.04	-0.11	0.20	0.16	0.31	0.84	0.31	0.27	0.42	0.94	-0.04	0.11	0.64	0.15	0.67	0.53
SL/5-MEAN	14.88	14.79	14.48	14.53	14.40	14.06	0.09	0.40	0.35	0.48	0.82	0.31	0.26	0.39	0.73	-0.05	0.08	0.42	0.13	0.47	0.34
H2-SL/6																					
6-1	14.32	14.82	14.60	14.45	14.45	14.27	-0.51	-0.28	-0.13	-0.13	0.05	0.23	0.37	0.38	0.56	0.14	0.15	0.33	0.00	0.18	0.18
6-2	14.32	14.47	14.20	14.00	14.13	14.09	-0.15	0.12	0.31	0.19	0.23	0.27	0.46	0.34	0.38	0.19	0.07	0.11	-0.13	-0.08	0.04
6-3	14.32	14.33	14.03	13.68	13.62	14.16	-0.02	0.28	0.63	0.70	0.16	0.30	0.65	0.71	0.18	0.35	0.41	-0.13	0.06	-0.47	-0.54
6-4	14.32	14.05	13.87	14.10	13.78	14.15	0.27	0.45	0.22	0.54	0.17	0.19	-0.05	0.27	-0.10	-0.23	0.09	-0.28	0.32	-0.05	-0.37
6-5	14.32	14.11	13.95	14.03	13.83	14.21	0.21	0.37	0.29	0.49	0.11	0.16	0.08	0.28	-0.10	-0.08	0.12	-0.26	0.20	-0.18	-0.38
6-6	14.32	14.20	14.10	13.88	13.92	14.09	0.12	0.22	0.44	0.40	0.23	0.10	0.32	0.28	0.11	0.22	0.18	0.01	-0.04	-0.21	-0.17
SL/6-MEAN	14.32	14.33	14.12	14.02	13.96	14.16	-0.01	0.20	0.29	0.36	0.16	0.21	0.31	0.37	0.17	0.10	0.16	-0.04	0.06	-0.14	-0.20
H2-SL/8																					
8-1	14.02	14.08	13.71	13.68	13.73	14.05	-0.05	0.31	0.34	0.29	-0.03	0.37	0.39	0.35	0.02	0.03	-0.02	-0.34	-0.05	-0.37	-0.32
8-2	14.02	14.15	13.63	13.48	13.59	14.15	-0.12	0.39	0.55	0.44	-0.13	0.51	0.67	0.56	-0.01	0.16	0.05	-0.52	-0.11	-0.67	-0.57
8-3	14.02	14.32	13.85	13.68	13.68	14.13	-0.29	0.17	0.35	0.34	-0.10	0.46	0.64	0.64	0.19	0.18	0.17	-0.27	0.00	-0.45	-0.45
8-4	14.02	14.13	13.68	13.47	13.66	13.87	-0.11	0.35	0.55	0.36	0.16	0.45	0.66	0.47	0.26	0.21	0.02	-0.19	-0.19	-0.40	-0.21
SL/8-MEAN	14.02	14.17	13.72	13.58	13.68	14.05	-0.14	0.31	0.45	0.34	-0.03	0.45	0.59	0.49	0.12	0.14	0.04	-0.33	-0.10	-0.47	-0.37
H2-MEAN	14.42	14.49	14.14	14.13	14.07	14.13	-0.07	0.28	0.29	0.35	0.29	0.35	0.36	0.42	0.36	0.01	0.07	0.01	0.06	0.00	-0.06

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

SUBLOT #			12% m.b.								DIFFERENCES										
	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
H4-SL/2																					
2-6	14.42	14.64	14.33	14.09	14.29	13.73	-0.22	0.09	0.33	0.13	0.69	0.31	0.55	0.35	0.91	0.24	0.04	0.60	-0.20	0.35	0.56
SL/2-MEAN	14.42	14.64	14.33	14.09	14.29	13.73	-0.22	0.09	0.33	0.13	0.69	0.31	0.55	0.35	0.91	0.24	0.04	0.60	-0.20	0.35	0.56
H4-SL/7																					
7-1	14.04	14.29	13.95	14.07	13.86	13.64	-0.25	0.09	-0.03	0.18	0.40	0.34	0.22	0.43	0.65	-0.12	0.09	0.31	0.21	0.43	0.22
7-2	14.04	14.40	14.01	13.73	13.96	13.73	-0.36	0.04	0.32	0.09	0.31	0.40	0.68	0.45	0.67	0.28	0.05	0.28	-0.23	0.00	0.22
7-3	14.04	14.09	13.69	13.40	13.77	13.82	-0.05	0.36	0.64	0.27	0.22	0.40	0.69	0.32	0.27	0.28	-0.08	-0.13	-0.37	-0.42	-0.05
7-4	14.04	14.36	13.95	13.56	13.55	13.72	-0.32	0.10	0.48	0.49	0.33	0.41	0.80	0.81	0.64	0.39	0.40	0.23	0.01	-0.16	-0.17
7-5	14.04	14.11	13.67	13.53	13.61	13.76	-0.07	0.37	0.51	0.44	0.29	0.44	0.58	0.50	0.35	0.14	0.06	-0.09	-0.08	-0.23	-0.15
7-6	14.04	14.24	13.73	13.61	13.53	13.73	-0.19	0.31	0.43	0.51	0.32	0.51	0.62	0.71	0.51	0.12	0.20	0.00	0.08	-0.11	-0.20
SL/7-MEAN	14.04	14.25	13.83	13.65	13.71	13.73	-0.21	0.21	0.39	0.33	0.31	0.42	0.60	0.54	0.52	0.18	0.12	0.10	-0.06	-0.08	-0.02
H4-SL/8																					
8-1	14.02	14.08	13.71	13.68	13.73	13.76	-0.05	0.31	0.34	0.29	0.27	0.37	0.39	0.35	0.32	0.03	-0.02	-0.04	-0.05	-0.07	-0.03
8-5	14.02	13.96	13.63	13.58	13.59	13.76	0.07	0.39	0.44	0.44	0.27	0.32	0.37	0.37	0.20	0.05	0.05	-0.12	0.00	-0.17	-0.17
SL/8-MEAN	14.02	14.02	13.67	13.63	13.66	13.76	0.01	0.35	0.39	0.36	0.27	0.34	0.38	0.36	0.26	0.04	0.01	-0.08	-0.03	-0.12	-0.10
H4-SL/9																					
9-1	14.12	14.04	13.79	13.46	13.52	13.74	0.09	0.33	0.67	0.61	0.39	0.24	0.58	0.52	0.30	0.34	0.28	0.05	-0.06	-0.28	-0.22
9-2	14.12	14.08	13.81	13.29	13.55	13.73	0.04	0.31	0.83	0.57	0.40	0.27	0.79	0.53	0.36	0.53	0.26	0.09	-0.26	-0.44	-0.18
9-3	14.12	14.05	13.67	13.24	13.66	13.65	0.08	0.45	0.88	0.46	0.47	0.38	0.80	0.39	0.39	0.42	0.01	0.01	-0.42	-0.41	0.01
9-4	14.12	14.18	13.78	13.49	13.75	13.71	-0.06	0.34	0.64	0.37	0.42	0.40	0.70	0.43	0.48	0.29	0.03	0.07	-0.26	-0.22	0.04
9-5	14.12	14.67	13.66	14.29	14.19	13.72	-0.55	0.47	-0.16	-0.07	0.40	1.02	0.39	0.48	0.95	-0.63	-0.53	-0.06	0.10	0.57	0.47
9-6	14.12	14.99	14.69	14.42	14.23	13.73	-0.06	-0.57	-0.29	-0.10	0.40	0.29	0.57	0.76	1.26	0.28	0.47	0.97	0.19	0.69	0.50
SL/9-MEAN	14.12	14.33	13.90	13.69	13.81	13.71	-0.21	0.22	0.43	0.31	0.41	0.43	0.64	0.52	0.62	0.21	0.09	0.19	-0.12	-0.02	0.10

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDD	NPK	KPK	KPA	KPDE	KPDD	KPK	KPA	KPDE	KPDD	KPA	KPDE	KPDD	KPDE	KPDD	KPDD
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
H4-SL/10																					
10-1	14.14	14.09	13.81	13.51	13.54	13.73	0.05	0.32	0.63	0.60	0.40	0.28	0.58	0.55	0.36	0.31	0.27	0.08	-0.03	-0.23	-0.19
10-2	14.14	14.57	14.31	14.27	13.91	13.73	-0.43	-0.17	-0.13	0.23	0.40	0.26	0.30	0.66	0.84	0.04	0.40	0.57	0.36	0.53	0.17
SL/10-MEAN	14.14	14.33	14.06	13.89	13.73	13.73	-0.19	0.08	0.25	0.41	0.40	0.27	0.44	0.60	0.60	0.17	0.33	0.33	0.16	0.15	0.00
H4-MEAN	14.06	14.05	13.89	13.72	13.78	13.72	0.01	0.17	0.34	0.28	0.34	0.16	0.33	0.27	0.33	0.17	0.11	0.17	-0.06	0.00	0.06
L5-SL/1																					
1-1	14.27	14.28	14.13	13.31	13.74	13.71	0.00	0.14	0.96	0.53	0.57	0.15	0.97	0.53	0.57	0.82	0.39	0.43	-0.43	-0.40	0.04
1-2	14.27	14.19	14.06	13.62	13.83	13.73	0.08	0.21	0.65	0.45	0.54	0.13	0.57	0.36	0.46	0.44	0.23	0.33	-0.20	-0.11	0.09
1-3	14.27	14.20	14.04	13.81	13.61	13.77	0.07	0.24	0.47	0.66	0.50	0.16	0.40	0.59	0.43	0.23	0.42	0.26	0.19	0.03	-0.16
1-4	14.27	14.15	14.14	13.64	13.61	13.73	0.12	0.13	0.63	0.66	0.54	0.01	0.51	0.53	0.42	0.50	0.52	0.41	0.02	-0.09	-0.11
1-5	14.27	14.09	13.94	13.81	13.53	13.66	0.18	0.33	0.47	0.74	0.61	0.15	0.29	0.56	0.43	0.14	0.41	0.28	0.28	0.15	-0.13
SL/1-MEAN	14.27	14.18	14.06	13.64	13.67	13.72	0.09	0.21	0.64	0.61	0.55	0.12	0.55	0.52	0.46	0.43	0.40	0.34	-0.03	-0.08	-0.05
L5-SL2																					
2-1	14.21	14.25	14.05	13.62	13.84	13.97	-0.04	0.16	0.58	0.36	0.23	0.20	0.62	0.40	0.27	0.42	0.20	0.07	-0.22	-0.35	-0.13
2-2	14.21	14.15	13.90	13.44	13.93	13.65	0.06	0.31	0.77	0.28	0.56	0.25	0.71	0.22	0.50	0.46	-0.03	0.25	-0.49	-0.21	0.28
2-3	14.21	13.98	14.01	13.41	13.71	13.76	0.23	0.19	0.80	0.49	0.44	-0.04	0.57	0.26	0.21	0.60	0.30	0.25	-0.30	-0.36	-0.05
2-4	14.21	14.23	14.17	13.51	13.64	14.02	-0.02	0.04	0.70	0.56	0.19	0.06	0.72	0.58	0.21	0.66	0.52	0.15	-0.14	-0.51	-0.38
2-5	14.21	14.00	13.85	13.72	13.64	13.71	0.20	0.36	0.48	0.56	0.50	0.15	0.28	0.36	0.30	0.13	0.20	0.14	0.08	0.02	-0.06
SL/2-MEAN	14.21	14.12	14.00	13.54	13.75	13.82	0.09	0.21	0.67	0.45	0.38	0.12	0.58	0.37	0.30	0.46	0.24	0.17	-0.21	-0.28	-0.07
L5-SL/3																					

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

			12% m.b.											DIFFERENCES							
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION				ORIGIN:NIR				QCTB:NIR				QCTB:K-J		ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ	2σ
3-1	14.24	14.03	13.79	13.06	13.66	13.91	0.21	0.45	1.18	0.58	0.33	0.24	0.97	0.37	0.12	0.74	0.13	-0.11	-0.60	-0.85	-0.24
3-2	14.24	14.20	14.04	13.85	13.84	13.79	0.04	0.19	0.39	0.40	0.45	0.16	0.35	0.36	0.41	0.19	0.20	0.25	0.01	0.06	0.05
3-4	14.24	14.20	13.95	13.71	13.86	13.78	0.04	0.29	0.53	0.38	0.46	0.25	0.49	0.34	0.41	0.24	0.09	0.16	-0.15	-0.08	0.08
SL/3-MEAN	14.24	14.14	13.93	13.54	13.79	13.83	0.10	0.31	0.70	0.45	0.41	0.22	0.60	0.36	0.32	0.39	0.14	0.10	-0.25	-0.29	-0.04
L5-MEAN	14.24	14.15	14.01	13.58	13.75	13.78	0.09	0.23	0.66	0.49	0.46	0.14	0.57	0.40	0.37	0.43	0.26	0.23	-0.17	-0.20	-0.03
L5-SL/4																					
4-1	14.72	14.01	13.94	13.91	13.73	14.25	0.71	0.77	0.81	0.98	0.47	0.06	0.10	0.27	-0.24	0.04	0.21	-0.31	0.17	-0.34	-0.51
4-2	14.72	13.94	14.01	13.64	13.93	14.36	0.78	0.70	1.08	0.79	0.36	-0.08	0.30	0.01	-0.42	0.38	0.09	-0.34	-0.29	-0.72	-0.43
4-3	14.72	14.29	13.80	13.65	14.06	14.24	0.42	0.92	1.06	0.66	0.47	0.49	0.64	0.24	0.05	0.15	-0.26	-0.44	-0.40	-0.59	-0.19
4-4	14.72	14.23	14.22	14.10	14.02	13.76	0.49	0.50	0.61	0.69	0.96	0.01	0.13	0.20	0.47	0.11	0.19	0.46	0.08	0.34	0.27
4-5	14.72	14.48	14.45	13.95	14.02	13.87	0.23	0.26	0.76	0.69	0.85	0.03	0.53	0.46	0.62	0.50	0.43	0.59	-0.07	0.09	0.16
SL/4-MEAN	14.72	14.19	14.09	13.85	13.95	14.09	0.53	0.63	0.87	0.76	0.62	0.10	0.34	0.24	0.10	0.24	0.13	-0.01	-0.10	-0.24	-0.14
L5-SL/3																					
3-3	14.24	14.14	13.91	13.55	13.55	13.89	0.10	0.33	0.68	0.69	0.35	0.23	0.59	0.59	0.25	0.36	0.36	0.02	0.00	-0.34	-0.34
3-5	14.24	14.09	14.11	13.89	13.84	13.89	0.15	0.13	0.35	0.40	0.35	-0.02	0.20	0.25	0.20	0.22	0.27	0.22	0.05	0.00	-0.05
SL/3-MEAN	14.24	14.12	14.01	13.72	13.69	13.89	0.12	0.23	0.52	0.55	0.35	0.11	0.39	0.42	0.22	0.29	0.32	0.12	0.03	-0.17	-0.20
L5-MEAN	14.58	14.17	14.07	13.81	13.88	14.03	0.41	0.51	0.77	0.70	0.55	0.10	0.36	0.29	0.14	0.26	0.19	0.04	-0.07	-0.22	-0.15

L0-H5

03-Feb-88

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDD	NPK	KPK	KPA	KPDE	KPDD	KPK	KPA	KPDE	KPDD	KPA	KPDE	KPDD	KPDE	KPDD	KPDD
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
SL/1																					
1-1	14.73	15.14	14.73	14.25	14.60	14.90	-0.41	0.00	0.48	0.13	-0.17	0.41	0.89	0.54	0.24	0.48	0.13	-0.17	-0.35	-0.65	-0.30
1-2	14.73	14.88	14.47	14.52	14.47	14.85	-0.15	0.26	0.22	0.26	-0.12	0.41	0.36	0.41	0.03	-0.05	0.00	-0.38	0.05	-0.33	-0.38
1-3	14.73	14.99	14.73	14.39	14.84	14.80	-0.26	0.01	0.35	-0.10	-0.07	0.26	0.60	0.15	0.19	0.34	-0.11	-0.08	-0.45	-0.42	0.03
1-4	14.73	14.78	14.69	14.82	14.23	14.77	-0.04	0.04	-0.08	0.51	-0.04	0.09	-0.04	0.55	0.01	-0.13	0.46	-0.08	0.59	0.05	-0.54
1-5	14.73	14.91	14.61	14.62	14.56	14.74	-0.18	0.12	0.12	0.17	-0.01	0.30	0.29	0.35	0.17	-0.01	0.05	-0.13	0.06	-0.12	-0.18
SL/1-MEAN	14.73	14.94	14.65	14.52	14.54	14.81	-0.21	0.09	0.21	0.19	-0.08	0.29	0.42	0.40	0.13	0.13	0.11	-0.17	-0.02	-0.29	-0.27
SL/2																					
2-1	14.85	14.58	14.53	14.52	14.69	14.83	0.27	0.32	0.33	0.16	0.02	0.05	0.06	-0.11	-0.25	0.01	-0.16	-0.30	-0.17	-0.31	-0.14
2-2	14.85	14.62	14.52	14.46	14.58	14.91	0.23	0.33	0.40	0.27	-0.07	0.10	0.17	0.04	-0.29	0.07	-0.06	-0.39	-0.13	-0.46	-0.34
2-3	14.85	14.74	14.64	14.43	14.49	14.35	0.11	0.21	0.41	0.36	0.50	0.10	0.31	0.25	0.40	0.21	0.15	0.30	-0.05	0.09	0.14
2-4	14.85	14.67	14.50	14.35	14.58	14.36	0.17	0.35	0.50	0.26	0.48	0.18	0.32	0.09	0.31	0.15	-0.09	0.13	-0.23	-0.01	0.22
2-5	14.85	14.74	14.63	14.65	14.81	14.42	0.11	0.22	0.20	0.04	0.43	0.11	0.09	-0.07	0.32	-0.02	-0.18	0.21	-0.16	0.23	0.39
SL/2-MEAN	14.85	14.67	14.56	14.48	14.63	14.57	0.18	0.28	0.37	0.22	0.27	0.11	0.19	0.04	0.10	0.08	-0.06	-0.01	-0.15	-0.09	0.05
SL/3																					
3-1	14.90	14.53	14.70	14.53	14.74	14.47	0.36	0.19	0.36	0.15	0.43	-0.17	0.00	-0.21	0.06	0.17	-0.04	0.23	-0.21	0.06	0.27
3-2	14.90	14.64	14.83	14.85	14.52	14.75	0.26	0.07	0.05	0.38	0.15	-0.19	-0.21	0.12	-0.11	-0.02	0.31	0.08	0.33	0.10	-0.23
3-3	14.90	14.60	14.91	14.53	14.40	14.75	0.30	-0.01	0.36	0.50	0.15	-0.31	0.06	0.20	-0.15	0.37	0.51	0.16	0.13	-0.22	-0.35
3-4	14.90	14.66	14.30	14.52	14.94	14.88	0.24	0.60	0.38	-0.05	0.01	0.36	0.14	-0.29	-0.23	-0.22	-0.65	-0.59	-0.42	-0.37	0.06
3-5	14.90	14.75	14.52	14.22	14.59	14.61	0.15	0.38	0.68	0.31	0.29	0.23	0.53	0.16	0.14	0.30	-0.07	-0.09	-0.37	-0.39	-0.02
SL/3-MEAN	14.90	14.63	14.65	14.53	14.64	14.69	0.26	0.25	0.37	0.26	0.21	-0.02	0.10	0.00	-0.06	0.12	0.01	-0.04	-0.11	-0.16	-0.05
NS-MEAN	14.83	14.75	14.62	14.51	14.60	14.69	0.08	0.21	0.32	0.23	0.14	0.13	0.24	0.15	0.06	0.11	0.02	-0.07	-0.09	-0.18	-0.09

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
L8-H5																					
4-1	14.70	15.01	14.47	14.50	14.30	14.46	-0.31	0.22	0.20	0.40	0.24	0.53	0.51	0.71	0.55	-0.03	0.17	0.02	0.20	0.04	-0.16
4-2	14.70	14.97	14.74	14.32	14.34	14.42	-0.27	-0.04	0.38	0.36	0.28	0.23	0.65	0.63	0.55	0.42	0.40	0.32	-0.02	-0.10	-0.08
4-3	14.70	14.75	14.37	14.17	14.49	14.69	-0.06	0.33	0.53	0.21	0.01	0.38	0.58	0.26	0.06	0.20	-0.12	-0.32	-0.32	-0.52	-0.20
4-4	14.70	14.73	14.32	14.00	14.55	14.53	-0.03	0.38	0.69	0.15	0.17	0.40	0.72	0.18	0.19	0.32	-0.23	-0.21	-0.55	-0.53	0.02
4-5	14.70	14.68	14.28	14.60	14.43	14.69	0.02	0.42	0.10	0.27	0.01	0.39	0.08	0.25	-0.01	-0.32	-0.14	-0.40	0.17	-0.09	-0.26
SL/4-MEAN	14.70	14.83	14.44	14.32	14.42	14.56	-0.13	0.26	0.38	0.28	0.14	0.39	0.51	0.41	0.27	0.12	0.02	-0.12	-0.10	-0.24	-0.14
SL/5																					
5-1	14.73	14.80	14.45	14.19	14.36	14.66	-0.06	0.29	0.54	0.37	0.07	0.35	0.61	0.44	0.14	0.26	0.09	-0.21	-0.17	-0.47	-0.30
5-2	14.73	14.79	14.52	14.48	14.55	14.52	-0.06	0.22	0.25	0.18	0.21	0.27	0.30	0.24	0.27	0.03	-0.03	-0.01	-0.06	-0.04	0.03
5-3	14.73	14.99	14.74	14.55	14.49	14.63	-0.26	-0.01	0.18	0.24	0.11	0.25	0.44	0.50	0.36	0.19	0.25	0.11	0.06	-0.08	-0.13
5-4	14.73	14.87	14.76	14.57	14.79	14.80	-0.14	-0.03	0.17	-0.05	-0.07	0.11	0.31	0.09	0.07	0.19	-0.03	-0.04	-0.22	-0.23	-0.01
5-5	14.73	14.81	14.33	13.82	14.22	14.74	-0.08	0.40	0.91	0.51	0.00	0.48	0.99	0.59	0.08	0.51	0.11	-0.40	-0.40	-0.91	-0.51
SL/5-MEAN	14.73	14.85	14.56	14.32	14.48	14.67	-0.12	0.17	0.41	0.25	0.06	0.29	0.53	0.37	0.18	0.24	0.08	-0.11	-0.16	-0.35	-0.19
H3-MEAN	14.75	14.84	14.50	14.32	14.45	14.62	-0.09	0.25	0.43	0.30	0.13	0.34	0.52	0.39	0.22	0.18	0.05	-0.12	-0.13	-0.30	-0.17
TIME-H#1/#3																					
1300	14.41	14.36	13.99	13.76	13.72	13.59	0.05	0.42	0.65	0.69	0.82	0.37	0.60	0.64	0.77	0.23	0.27	0.40	0.04	0.17	0.13
1430	14.41	14.38	13.97	13.74	13.68	13.58	0.03	0.44	0.67	0.73	0.83	0.41	0.64	0.70	0.80	0.23	0.29	0.39	0.06	0.16	0.10
1600	14.41	14.36	13.96	13.74	13.69	13.72	0.05	0.45	0.67	0.72	0.69	0.40	0.62	0.67	0.64	0.22	0.27	0.24	0.05	0.02	-0.03
1730	14.41	14.36	13.96	13.74	13.69	13.64	0.05	0.45	0.67	0.72	0.77	0.40	0.62	0.67	0.72	0.22	0.27	0.32	0.05	0.10	0.05
1900	14.41	14.41	14.00	13.79	13.71	13.60	0.00	0.41	0.62	0.70	0.81	0.41	0.62	0.70	0.81	0.21	0.29	0.40	0.08	0.19	0.11
2000	14.41	14.41	14.01	13.80	13.71	13.64	0.00	0.40	0.61	0.70	0.77	0.40	0.61	0.70	0.77	0.21	0.30	0.37	0.09	0.16	0.07

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

		12% m.b.											DIFFERENCES								
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION			ORIGIN:NIR					QCTB:NIR			QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
2100	14.41	14.43	14.02	13.78	13.72	13.60	-0.02	0.39	0.63	0.69	0.81	0.41	0.65	0.71	0.83	0.24	0.30	0.42	0.06	0.18	0.12
2200	14.41	14.44	14.03	13.73	13.73	13.60	-0.03	0.38	0.68	0.68	0.81	0.41	0.71	0.71	0.84	0.30	0.30	0.43	0.00	0.13	0.13
2330	14.41	14.42	14.03	13.72	13.73	13.62	-0.01	0.38	0.69	0.68	0.79	0.39	0.70	0.69	0.80	0.31	0.30	0.41	-0.01	0.10	0.11
0030	14.29	14.38	13.97	13.68	13.70	13.76	-0.09	0.32	0.61	0.59	0.53	0.41	0.70	0.68	0.62	0.29	0.27	0.21	-0.02	-0.08	-0.06
0130	14.29	14.45	14.02	13.75	13.72	13.88	-0.16	0.27	0.54	0.57	0.41	0.43	0.70	0.73	0.57	0.27	0.30	0.14	0.03	-0.13	-0.16
0230	14.31	14.42	13.96	13.66	13.66	13.77	-0.11	0.35	0.65	0.65	0.54	0.46	0.76	0.76	0.65	0.30	0.30	0.19	0.00	-0.11	-0.11
0330	14.29	14.42	13.96	13.67	13.67	13.63	-0.13	0.33	0.62	0.62	0.66	0.46	0.75	0.75	0.79	0.29	0.29	0.33	0.00	0.04	0.04
0430	14.29	14.47	14.01	13.73	13.75	13.65	-0.18	0.28	0.56	0.54	0.64	0.46	0.74	0.72	0.82	0.28	0.26	0.36	-0.02	0.08	0.10
0530	14.29	14.46	13.98	13.69	13.73	13.69	-0.17	0.31	0.60	0.56	0.60	0.48	0.77	0.73	0.77	0.29	0.25	0.29	-0.04	0.00	0.04
0630	14.22	14.46	13.98	13.69	13.73	13.66	-0.24	0.24	0.53	0.49	0.56	0.48	0.77	0.73	0.80	0.29	0.25	0.32	-0.04	0.03	0.07
0730	14.22	14.34	13.88	13.63	13.67	13.67	-0.12	0.34	0.59	0.55	0.55	0.46	0.71	0.67	0.67	0.25	0.21	0.21	-0.04	-0.04	0.00
0830	14.22	14.34	13.88	13.64	13.68	13.67	-0.12	0.34	0.58	0.54	0.55	0.46	0.70	0.66	0.67	0.24	0.20	0.21	-0.04	-0.03	0.01
0930	14.22	14.29	13.88	13.59	13.70	13.54	-0.07	0.34	0.63	0.52	0.68	0.41	0.70	0.59	0.75	0.29	0.18	0.34	-0.11	0.05	0.16
1030	14.22	14.12	13.69	13.48	13.54	13.73	0.10	0.53	0.74	0.68	0.49	0.43	0.64	0.58	0.39	0.21	0.15	-0.04	-0.06	-0.25	-0.19
1130	14.22	14.12	13.69	13.50	13.52	13.53	0.10	0.53	0.72	0.70	0.69	0.43	0.62	0.60	0.59	0.19	0.17	0.16	-0.02	-0.03	-0.01
1230	14.22	14.07	13.69	13.48	13.54	13.67	0.15	0.53	0.74	0.68	0.55	0.38	0.59	0.53	0.40	0.21	0.15	0.02	-0.06	-0.19	-0.13
1330	14.22	13.98	13.69	13.48	13.54	13.66	0.24	0.53	0.74	0.68	0.56	0.29	0.50	0.44	0.32	0.21	0.15	0.03	-0.06	-0.18	-0.12
1530	14.22	13.98	13.71	13.52	13.54	13.66	0.24	0.51	0.70	0.68	0.56	0.27	0.46	0.44	0.32	0.19	0.17	0.05	-0.02	-0.14	-0.12
1630	14.22	13.98	13.71	13.52	13.54	13.72	0.24	0.51	0.70	0.68	0.50	0.27	0.46	0.44	0.26	0.19	0.17	-0.01	-0.02	-0.20	-0.18
1730	14.24	13.98	13.69	13.51	13.50	13.61	0.26	0.55	0.73	0.74	0.63	0.29	0.47	0.48	0.37	0.18	0.19	0.08	0.01	-0.10	-0.11
1830	14.24	14.02	13.74	13.58	13.51	13.65	0.22	0.50	0.66	0.73	0.59	0.28	0.44	0.51	0.37	0.16	0.23	0.09	0.07	-0.07	-0.14
1930	14.24	14.02	13.74	13.59	13.51	13.61	0.22	0.50	0.65	0.73	0.63	0.28	0.43	0.51	0.41	0.15	0.23	0.13	0.08	-0.02	-0.10
2030	14.24	14.10	13.88	13.63	13.64	13.75	0.14	0.36	0.61	0.60	0.49	0.22	0.47	0.46	0.35	0.25	0.24	0.13	-0.01	-0.12	-0.11
2230	14.24	14.10	13.88	13.63	13.64	13.58	0.14	0.36	0.61	0.60	0.66	0.22	0.47	0.46	0.52	0.25	0.24	0.30	-0.01	0.05	0.06
2330	14.24	14.11	13.90	13.64	13.65	13.55	0.13	0.34	0.60	0.59	0.69	0.21	0.47	0.46	0.56	0.26	0.25	0.35	-0.01	0.09	0.10
H1/3-MEAN	14.29	14.26	13.89	13.65	13.65	13.65	0.03	0.41	0.65	0.65	0.64	0.38	0.62	0.62	0.61	0.24	0.24	0.23	0.00	0.00	-0.01

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

		12% m.b.					DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
TIME-HR1																					
1200	14.33	14.38	14.19	13.78	13.66	14.09	-0.05	0.14	0.55	0.67	0.24	0.19	0.60	0.72	0.29	0.41	0.53	0.10	0.12	-0.31	-0.43
1630	14.33	14.16	13.87	13.87	13.65	13.87	0.17	0.46	0.46	0.68	0.46	0.29	0.29	0.51	0.29	0.00	0.22	0.00	0.22	0.00	-0.22
1700	14.33	14.47	14.07	14.03	13.76	13.68	-0.14	0.26	0.30	0.57	0.65	0.40	0.44	0.71	0.79	0.04	0.31	0.39	0.27	0.35	0.08
1900	14.33	14.32	13.96	14.06	13.56	13.78	0.01	0.37	0.27	0.77	0.55	0.36	0.26	0.76	0.54	-0.10	0.40	0.18	0.50	0.28	-0.22
2100	14.33	14.60	14.28	13.91	13.73	13.62	-0.27	0.05	0.42	0.60	0.71	0.32	0.69	0.87	0.98	0.37	0.55	0.66	0.18	0.29	0.11
2300	14.33	14.57	14.34	13.76	13.73	13.68	-0.24	-0.01	0.57	0.60	0.65	0.23	0.81	0.84	0.89	0.58	0.61	0.66	0.03	0.08	0.05
0100	14.33	14.47	14.23	13.47	13.78	13.79	-0.14	0.10	0.86	0.55	0.54	0.24	1.00	0.69	0.68	0.76	0.45	0.44	-0.31	-0.32	-0.01
0300	14.33	14.44	13.10	13.95	13.80	13.97	-0.11	1.23	0.38	0.53	0.36	1.34	0.49	0.64	0.47	-0.85	-0.70	-0.87	0.15	-0.02	-0.17
0500	14.35	14.41	13.90	13.96	13.79	13.87	-0.06	0.45	0.39	0.56	0.48	0.51	0.45	0.62	0.54	-0.06	0.11	0.03	0.17	0.09	-0.08
0700	14.57	14.51	14.08	13.74	13.57	13.86	0.06	0.49	0.83	1.00	0.71	0.43	0.77	0.94	0.65	0.34	0.51	0.22	0.17	-0.12	-0.29
0900	14.57	14.47	14.13	13.98	13.74	13.82	0.10	0.44	0.59	0.83	0.75	0.34	0.49	0.73	0.65	0.15	0.39	0.31	0.24	0.16	-0.08
1100	14.57	14.49	14.03	13.89	13.86	13.61	0.08	0.54	0.68	0.71	0.96	0.46	0.60	0.63	0.88	0.14	0.17	0.42	0.03	0.28	0.25
1300	14.57	14.33	13.78	13.80	13.79	13.59	0.24	0.79	0.77	0.78	0.98	0.55	0.53	0.54	0.74	-0.02	-0.01	0.19	0.01	0.21	0.20
1500	14.53	14.14	13.80	13.20	13.60	13.68	0.39	0.73	1.33	0.93	0.85	0.34	0.94	0.54	0.46	0.60	0.20	0.12	-0.40	-0.48	-0.08
1700	14.19	14.18	13.63	13.68	13.45	13.58	0.01	0.56	0.51	0.74	0.61	0.55	0.50	0.73	0.60	-0.05	0.18	0.05	0.23	0.10	-0.13
1900	14.19	14.94	13.59	13.41	13.55	14.04	-0.75	0.60	0.78	0.64	0.15	1.35	1.53	1.39	0.90	0.18	0.04	-0.45	-0.14	-0.63	-0.49
2100	14.19	14.09	13.75	13.56	13.39	13.78	0.10	0.44	0.63	0.80	0.41	0.34	0.53	0.70	0.31	0.19	0.36	0.03	0.17	-0.22	-0.39
1300	14.19	14.19	13.83	13.54	13.46	13.55	0.00	0.36	0.65	0.73	0.64	0.36	0.65	0.73	0.64	0.29	0.37	0.28	0.08	-0.01	-0.09
0100	14.19	13.96	13.60	13.71	13.52	13.52	0.23	0.59	0.48	0.67	0.67	0.36	0.25	0.44	0.44	-0.11	0.08	0.08	0.19	0.19	0.00
0300	14.19	13.92	13.61	13.27	13.67	13.54	0.27	0.58	0.92	0.52	0.65	0.31	0.65	0.25	0.38	0.34	-0.06	0.07	-0.40	-0.27	0.13
0500	14.19	14.07	13.78	13.32	13.62	13.59	0.12	0.41	0.87	0.57	0.60	0.29	0.75	0.45	0.48	0.46	0.16	0.19	-0.30	-0.27	0.03
0700	14.19	14.12	13.91	13.19	13.47	13.54	0.07	0.28	1.00	0.72	0.65	0.21	0.93	0.65	0.58	0.72	0.44	0.37	-0.28	-0.35	-0.07
0900	14.19	14.12	13.65	13.28	13.51	13.56	0.07	0.54	0.91	0.68	0.63	0.47	0.84	0.61	0.56	0.37	0.14	0.09	-0.23	-0.28	-0.05

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDO	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1100	14.20	14.03	13.42	13.50	13.50	13.64	0.17	0.78	0.70	0.70	0.56	0.61	0.53	0.53	0.39	-0.08	-0.08	-0.22	0.00	-0.14	-0.14
1300	14.29	14.04	13.47	13.88	13.63	13.69	0.25	0.82	0.41	0.66	0.60	0.57	0.16	0.41	0.35	-0.41	-0.16	-0.22	0.25	0.19	-0.06
1500	14.29	14.18	13.55	13.53	13.56	13.55	0.11	0.74	0.76	0.73	0.74	0.63	0.65	0.62	0.63	0.02	-0.01	0.00	-0.03	-0.02	0.01
1800	14.29	14.11	13.58	13.73	13.60	13.48	0.18	0.71	0.56	0.69	0.81	0.53	0.38	0.51	0.63	-0.15	-0.02	0.10	0.13	0.25	0.12
1900	14.29	14.15	13.60	13.57	13.62	13.59	0.14	0.69	0.72	0.67	0.70	0.55	0.58	0.53	0.56	0.03	-0.02	0.01	-0.05	-0.02	0.03
2100	14.29	14.15	13.78	13.72	13.58	13.54	0.14	0.51	0.57	0.71	0.75	0.37	0.43	0.57	0.61	0.06	0.20	0.24	0.14	0.18	0.04
2300	14.29	14.17	13.94	13.57	13.59	13.59	0.12	0.35	0.72	0.70	0.70	0.23	0.60	0.58	0.58	0.37	0.35	0.35	-0.02	-0.02	0.00
H1-MEAN	14.32	14.27	13.82	13.66	13.62	13.69	0.05	0.51	0.66	0.70	0.63	0.46	0.61	0.65	0.58	0.15	0.19	0.13	0.04	-0.03	-0.07
TIME-H#3																					
1200	14.19	14.00	13.69	13.31	13.66	13.58	0.19	0.50	0.88	0.53	0.61	0.31	0.69	0.34	0.42	0.38	0.03	0.11	-0.35	-0.27	0.08
1630	14.24	14.13	13.88	13.28	13.52	13.77	0.11	0.36	0.96	0.72	0.47	0.25	0.85	0.61	0.36	0.60	0.36	0.11	-0.24	-0.49	-0.25
1700	14.40	14.13	13.76	14.47	13.52	13.70	0.27	0.64	-0.07	0.88	0.70	0.37	-0.34	0.61	0.43	-0.71	0.24	0.06	0.95	0.77	-0.18
1900	14.40	14.05	13.75	13.65	13.45	13.52	0.35	0.65	0.75	0.95	0.88	0.30	0.40	0.60	0.53	0.10	0.30	0.23	0.20	0.13	-0.07
2100	14.40	13.98	13.66	13.47	13.47	13.70	0.42	0.74	0.93	0.93	0.70	0.32	0.51	0.51	0.28	0.19	0.19	-0.04	0.00	-0.23	-0.23
2300	14.40	13.92	13.75	13.68	13.56	13.70	0.48	0.65	0.72	0.84	0.70	0.17	0.24	0.36	0.22	0.07	0.19	0.05	0.12	-0.02	-0.14
0100	14.40	13.97	13.74	13.57	13.52	13.72	0.43	0.66	0.83	0.88	0.68	0.23	0.40	0.45	0.25	0.17	0.22	0.02	0.05	-0.15	-0.20
0300	14.38	14.01	13.92	13.86	13.54	13.66	0.37	0.46	0.52	0.84	0.72	0.08	0.15	0.47	0.35	0.06	0.38	0.26	0.32	0.20	-0.12
0500	14.37	14.23	14.04	13.57	13.74	13.60	0.14	0.33	0.80	0.63	0.77	0.19	0.66	0.49	0.63	0.47	0.30	0.44	-0.17	-0.03	0.14
0700	14.37	14.15	14.06	13.62	13.67	13.78	0.22	0.31	0.75	0.70	0.59	0.09	0.53	0.48	0.37	0.44	0.39	0.28	-0.05	-0.16	-0.11
0900	14.37	14.18	13.91	13.63	13.55	13.69	0.19	0.46	0.74	0.82	0.68	0.27	0.55	0.63	0.49	0.28	0.36	0.22	0.08	-0.06	-0.14
1100	14.37	14.03	13.73	13.18	13.53	13.74	0.34	0.64	1.19	0.84	0.63	0.30	0.85	0.50	0.29	0.55	0.20	-0.01	-0.35	-0.56	-0.21
1300	14.34	14.12	13.85	13.52	13.56	13.64	0.22	0.49	0.82	0.78	0.70	0.27	0.60	0.56	0.48	0.33	0.29	0.21	-0.04	-0.12	-0.08
1500	14.30	13.96	13.77	13.35	13.59	13.70	0.34	0.53	0.95	0.71	0.60	0.19	0.61	0.37	0.26	0.42	0.18	0.07	-0.24	-0.35	-0.11

TABLE V - SOUTHEAST ASIA PROTEIN DATA COLLABORATIVE COMPARISON

	12% m.b.						DIFFERENCES														
SUBLOT #	ORIGIN	QC TB		ARS	DESTINATION		ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
	NPE	NPK	KPK	KPA	KPDE	KPDD	NPK	KPK	KPA	KPDE	KPDD	KPK	KPA	KPDE	KPDD	KPA	KPDE	KPDD	KPDE	KPDD	KPDD
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
1700	14.30	14.04	13.81	13.23	13.61	13.62	0.26	0.49	1.07	0.69	0.68	0.23	0.81	0.43	0.42	0.58	0.20	0.19	-0.38	-0.39	-0.01
1900	14.30	13.89	13.59	13.55	13.51	13.90	0.41	0.71	0.75	0.79	0.40	0.30	0.34	0.38	-0.01	0.04	0.08	-0.31	0.04	-0.35	-0.39
2100	14.30	13.91	13.72	13.36	13.57	13.60	0.39	0.58	0.94	0.73	0.70	0.19	0.55	0.34	0.31	0.36	0.15	0.12	-0.21	-0.24	-0.03
1100	14.30	14.18	13.86	13.28	13.78	13.52	0.12	0.44	1.02	0.52	0.78	0.32	0.90	0.40	0.66	0.58	0.08	0.34	-0.50	-0.24	0.26
0100	14.27	13.83	13.65	13.34	13.50	13.52	0.44	0.62	0.93	0.77	0.75	0.18	0.49	0.33	0.31	0.31	0.15	0.13	-0.16	-0.18	-0.02
0300	14.27	13.90	13.72	13.36	13.46	13.52	0.37	0.55	0.91	0.81	0.75	0.18	0.54	0.44	0.38	0.36	0.26	0.20	-0.10	-0.16	-0.06
0500	14.27	13.99	13.70	13.43	13.47	13.49	0.28	0.57	0.84	0.80	0.78	0.29	0.56	0.52	0.50	0.27	0.23	0.21	-0.04	-0.06	-0.02
0700	14.27	14.00	13.69	13.31	13.45	13.58	0.27	0.58	0.96	0.82	0.69	0.31	0.69	0.55	0.42	0.38	0.24	0.11	-0.14	-0.27	-0.13
0900	14.27	14.04	13.68	13.31	13.46	13.67	0.23	0.59	0.96	0.81	0.60	0.36	0.73	0.58	0.37	0.37	0.22	0.01	-0.15	-0.36	-0.21
1100	14.27	14.04	13.81	13.02	13.46	13.64	0.23	0.46	1.25	0.81	0.63	0.23	1.02	0.58	0.40	0.79	0.35	0.17	-0.44	-0.62	-0.18
H3-MEAN	14.32	14.03	13.78	13.47	13.55	13.65	0.29	0.54	0.85	0.77	0.67	0.25	0.56	0.48	0.38	0.31	0.23	0.13	-0.08	-0.18	-0.10

KEY:

NPE = Origin-NIR protein or certificated protein
NPK = QC1-NIR protein
KPK = QC1-Kjeldahl protein
KPA = ARS Kjeldahl protein
KPDE = Destination-Kjeldahl protein on origin samples
KPDD = Destination-Kjeldahl protein on desitnation samples
%M = Percent moisture
%P = Percent protein
12% m.b. = 12 percent moisture basis

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TABLE VI - SOUTHEAST ASIA PROTEIN SUBLOT DIFFERENCES

						DIFFERENCES									
SUBLOT	ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
NO.	NPK %	KPK %	KPA %	KPDE %	KPDD %	KPK %	KPA %	KPDE %	KPDD %	KPA %	KPDE %	KPDD %	KPDE %	KPDD %	KPDD %
1	0.21	0.41	0.53	-0.01	0.49	0.20	0.32	-0.22	0.28	0.11	-0.43	0.09	-0.54	-0.04	0.50
2	0.21	0.48	0.59	0.21	0.19	0.27	0.38	0.00	-0.02	0.11	-0.26	-0.38	-0.38	-0.40	-0.02
3	0.12	0.45	0.56	0.62	0.43	0.33	0.44	0.50	0.31	0.11	0.17	-0.02	0.06	-0.13	-0.19
4	0.33	0.50	0.61	0.39	0.33	0.17	0.27	0.05	0.00	0.11	-0.11	0.17	-0.22	0.28	-0.06
5	0.12	0.17	0.27	0.38	0.38	0.05	0.16	0.26	0.26	0.11	0.21	0.21	0.10	0.10	0.00
6	0.42	0.59	0.70	0.64	0.71	0.17	0.29	0.22	0.29	0.11	0.05	0.12	-0.06	0.01	0.07
7	0.46	0.54	0.65	0.75	0.69	0.08	0.19	0.29	0.23	0.11	0.21	0.15	0.10	0.04	-0.06
8	-0.28	-0.13	-0.08	0.17	0.05	0.15	0.20	0.44	0.32	0.05	0.29	0.17	0.25	0.13	-0.12
9	0.06	0.31	0.44	0.57	0.31	0.25	0.39	0.51	0.25	0.13	0.26	0.00	0.13	0.13	-0.26
10	-0.31	-0.05	0.27	0.15	0.39	0.26	0.57	0.46	0.70	0.31	0.20	0.44	0.12	0.12	0.24
11	0.05	0.37	0.25	0.48	0.31	0.32	0.20	0.43	0.26	-0.12	0.11	-0.06	0.23	0.06	-0.17
12	0.09	0.40	0.35	0.48	0.82	0.31	0.26	0.39	0.73	-0.05	0.08	0.42	0.13	0.47	0.34
13	-0.01	0.20	0.29	0.36	0.16	0.21	0.31	0.37	0.17	0.10	0.16	-0.04	0.06	-0.14	-0.20
14	-0.14	0.31	0.45	0.34	-0.03	0.45	0.59	0.49	0.12	0.14	0.04	-0.33	-0.10	-0.47	-0.37
15	-0.22	0.09	0.33	0.13	0.69	0.31	0.55	0.35	0.91	0.24	0.04	0.60	-0.20	0.35	0.56
16	-0.21	0.21	0.39	0.33	0.31	0.42	0.60	0.54	0.52	0.18	0.12	0.10	0.06	-0.08	-0.02
17	0.01	0.35	0.39	0.36	0.27	0.34	0.38	0.36	0.26	0.04	0.01	-0.08	-0.03	-0.12	-0.10
18	-0.21	0.22	0.43	0.31	0.41	0.43	0.64	0.52	0.62	0.21	0.09	0.19	-0.12	-0.02	0.10
19	-0.19	0.08	0.25	0.41	0.40	0.27	0.44	0.60	0.60	0.17	0.33	0.33	0.16	0.15	0.00
20	0.09	0.21	0.64	0.61	0.55	0.12	0.55	0.52	0.46	0.43	0.40	0.34	0.03	-0.08	0.05

TABLE VI - SOUTHEAST ASIA PROTEIN SUBLOT DIFFERENCES

SUBLOT						DIFFERENCES									
	ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
NO.	NPK %P	KPK %P	KPA %P	KPDE %P	KPDD %P	KPK %P	KPA %P	KPDE %P	KPDD %P	KPA %P	KPDE %P	KPDD %P	KPDE %P	KPDD %P	KPDD %P
21	0.09	0.21	0.67	0.45	0.38	0.12	0.58	0.37	0.30	0.46	0.24	0.17	-0.21	-0.28	-0.07
22	0.10	0.31	0.70	0.45	0.41	0.22	0.60	0.36	0.32	0.39	0.14	0.10	-0.25	-0.29	-0.04
23	0.53	0.63	0.87	0.76	0.62	0.10	0.34	0.24	0.10	0.24	0.13	-0.01	-0.10	-0.24	-0.14
24	0.12	0.23	0.52	0.55	0.35	0.11	0.39	0.42	0.22	0.29	0.32	0.12	0.03	-0.17	-0.20
25	-0.21	0.09	0.21	0.19	-0.08	0.29	0.42	0.40	0.13	0.13	0.11	-0.17	-0.02	-0.29	-0.27
26	0.18	0.28	0.37	0.22	0.27	0.11	0.19	0.04	0.10	0.08	-0.06	-0.01	-0.15	-0.09	0.05
27	0.26	0.25	0.37	0.26	0.21	-0.02	0.10	0.00	-0.06	0.12	0.01	-0.04	-0.11	-0.16	-0.05
28	-0.13	0.26	0.38	0.28	0.14	0.39	0.51	0.41	0.27	0.12	0.02	-0.12	-0.10	-0.24	-0.14
29	-0.12	0.17	0.41	0.25	0.06	0.29	0.53	0.37	0.18	0.24	0.08	-0.11	-0.16	-0.35	-0.19
30	-0.09	0.63	0.89	0.74	0.65	0.47	0.53	0.58	0.49	0.06	0.10	0.02	0.05	-0.04	-0.09
31	0.12	0.47	0.76	0.68	0.56	0.34	0.64	0.56	0.44	0.29	0.22	0.09	-0.08	-0.20	-0.12
32	-0.06	0.23	0.51	0.64	0.64	0.29	0.56	0.70	0.69	0.28	0.41	0.41	0.14	0.13	0.00
33	-0.02	0.38	0.63	0.70	0.62	0.40	0.65	0.72	0.64	0.25	0.32	0.24	0.07	-0.01	-0.08
34	0.31	0.57	0.98	0.78	0.65	0.26	0.67	0.48	0.34	0.41	0.22	0.08	-0.19	-0.33	-0.13
35	0.28	0.52	0.92	0.73	0.66	0.24	0.65	0.46	0.38	0.40	0.00	0.13	-0.19	-0.27	-0.08
36	0.26	0.47	0.86	0.69	0.71	0.21	0.60	0.44	0.45	0.39	0.22	0.23	-0.16	-0.15	-0.01
37	0.39	0.66	0.83	0.79	0.68	0.28	0.44	0.41	0.29	0.16	0.13	0.01	-0.04	-0.15	-0.12
38	0.09	0.41	0.72	0.54	0.57	0.32	0.63	0.45	0.48	0.32	0.14	0.17	-0.18	-0.15	0.03
39	0.00	0.32	0.68	0.69	0.86	0.21	0.57	0.59	0.76	0.36	0.37	0.54	0.01	0.19	0.17
40	0.16	0.63	0.69	0.71	0.72	0.47	0.53	0.55	0.56	0.06	0.08	0.09	0.02	0.03	0.01

TABLE VI - SOUTHEAST ASIA PROTEIN SUBLOT DIFFERENCES

	DIFFERENCES														
SUBLOT	ORIGIN:NIR					QCTB:NIR				QCTB:K-J			ARS:K-J		DEST'N
NO.	NPK	KPK	KPA	KPDE	KPDO	KPK	KPA	KPDE	KPDO	KPA	KPDE	KPDO	KPDE	KPDO	KPDO
	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P	%P
41	0.12	0.47	0.76	0.67	0.62	0.34	0.64	0.54	0.49	0.29	0.20	0.15	-0.10	-0.14	-0.05
42	0.12	0.58	0.68	0.81	0.83	0.46	0.56	0.69	0.71	0.10	0.23	0.25	0.13	0.16	0.02
43	-0.02	0.38	0.63	0.70	0.44	0.40	0.65	0.73	0.47	0.25	0.32	0.06	0.08	-0.18	-0.26
44	0.31	0.57	0.98	0.81	0.88	0.26	0.67	0.50	0.37	0.41	0.24	0.11	-0.17	-0.30	-0.13
45	0.28	0.52	0.92	0.89	0.69	0.24	0.65	0.42	0.42	0.40	0.17	0.17	-0.23	-0.23	0.00
46	0.26	0.47	0.86	0.77	0.67	0.21	0.60	0.51	0.41	0.39	0.30	0.20	-0.09	-0.18	-0.10
47	0.39	0.66	0.83	0.91	0.71	0.28	0.44	0.52	0.33	0.16	0.24	0.05	0.08	-0.11	-0.19
48	0.09	0.41	0.72	0.52	0.53	0.32	0.63	0.43	0.44	0.32	0.12	0.12	-0.20	-0.20	0.00
49	0.11	0.46	0.88	0.80	0.86	0.35	0.57	0.69	0.76	0.22	0.34	0.41	0.12	0.18	0.07
50	-0.06	0.23	0.51	0.64	0.52	0.29	0.56	0.70	0.58	0.28	0.41	0.29	0.13	0.01	-0.12

KEY:

NPE = Origin-NIR protein or certificated protein
NPK = QCL-NIR protein
KPK = QCL-Kjeldahl protein
KPA = ARS Kjeldahl protein
KPDE = Destination-Kjeldahl protein on origin samples
KPDO = Destination-Kjeldahl protein on desitnation samples
%P = Percent protein

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-------------------- DESCRIPTIVE STATISTICS --------------------

            TABLE VII - SOUTHEAST ASIA SUBLOT DIFFERENCES

NO.  NAME        N        MEAN      STD. DEV.     MINIMUM       MAXIMUM
  1  NPE-NPK    50       .0889        .2013       -.3061         .5266
  2  NPE-KPK    50       .3636        .1854       -.1261         .6600
  3  NPE-KPA    50       .5730        .2303       -.0797         .9800
  4  NPE-KPDE   50       .5220        .2266       -.0133         .9100
  5  NPE-KPDD   50       .4822        .2371       -.0795         .8600
  6  NPK-KPK    50       .2675        .1136       -.0154         .4700
  7  NPK-KPA    50       .4768        .1610        .1043         .6700
  8  NPK-KPDE   50       .4270        .1965       -.2235         .7300
  9  NPK-KPDD   50       .3867        .2195       -.0561         .9093
 10  KPK-KPA    50       .2094        .1334       -.1183         .4550
 11  KPK-KPDE   50       .1546        .1609       -.4251         .4100
 12  KPK-KPDD   50       .1184        .1933       -.3311         .5962
 13  KPA-KPDE   50      -.0503        .1564       -.5399         .2461
 14  KPA-KPDD   50      -.0901        .1908       -.4736         .4704
 15  KPD-KPDD   50      -.0405        .1728       -.3700         .5570
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KEY:

NPE = Origin-NIR protein or certified protein
NPK = QCL-NIR protein
KPK = QCL-Kjeldahl protein
KPA = ARS-Kjeldahl protein
KPDE = Destination-Kjeldahl protein on origin samples
KPDD = Destination-Kjeldahl protein on destination samples

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (NORTH)

										12% m.b.		DIFFERENCES		
DATE	E/O	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
02-Dec	E	HRS	12.30	11.07	14.21	10.44	13.78	13.88	14.06	13.52	13.64	0.54	0.42	-0.12
03-Dec	E	HRS	10.80	10.16	14.31	10.36	13.94	13.88	14.02	13.68	13.63	0.33	0.39	0.06
03-Dec	E	HRS	13.00	11.27	14.41	11.32	14.13	14.14	14.29	14.02	14.03	0.27	0.28	-0.01
04-Dec	D	HRS	12.10	11.09	14.02	11.38	13.73	13.73	13.88	13.63	13.63	0.24	0.24	0.00
04-Dec	D	HRS	12.50	11.20	14.38	11.27	14.17	14.10	14.25	14.05	13.98	0.20	0.27	0.07
04-Dec	D	HRS	10.80	10.30	14.20	10.38	14.39	14.14	13.93	14.13	13.88	-0.20	0.05	0.25
04-Dec	D	HRS	10.70	10.48	14.41	10.15	14.07	14.03	14.17	13.78	13.74	0.39	0.42	0.04
04-Dec	E	HRS	11.30	10.45	14.22	10.48	14.02	13.88	13.97	13.78	13.64	0.19	0.33	0.14
05-Dec	D	HRS	8.40	7.82	15.48	7.86	15.52	15.70	14.78	14.82	14.99	-0.04	-0.22	-0.17
05-Dec	D	HRS	10.60	9.96	14.30	9.97	13.86	13.96	13.98	13.55	13.65	0.43	0.33	-0.10
05-Dec	E	HRS	11.50	10.33	13.87	10.47	14.23	14.00	13.61	13.99	13.76	-0.38	-0.15	0.23
05-Dec	E	HRS	11.20	10.97	13.77	10.00	13.89	13.74	13.61	13.58	13.43	0.03	0.18	0.15
05-Dec	E	HRS	11.20	10.77	13.77	10.27	13.30	13.37	13.58	13.04	13.11	0.54	0.47	-0.07
05-Dec	D	HRS	11.00	10.80	14.64	10.14	14.22	13.92	14.44	13.93	13.63	0.52	0.81	0.29
05-Dec	D	HRS	11.30	11.00	14.19	10.42	14.29	14.32	14.03	14.04	14.07	-0.01	-0.04	-0.03
05-Dec	D	HRS	12.80	11.56	14.24	10.99	14.07	14.22	14.17	13.91	14.06	0.26	0.11	-0.15
05-Dec	D	HRS	12.40	10.84	14.13	10.85	13.96	14.12	13.95	13.78	13.94	0.17	0.01	-0.16
08-Dec	E	HRS	11.30	10.95	14.52	10.58	14.67	14.85	14.35	14.44	14.61	-0.09	-0.27	-0.18
08-Dec	E	HRS	11.60	10.51	14.44	10.52	14.44	14.40	14.20	14.20	14.16	0.00	0.04	0.04
08-Dec	E	HRS	11.30	10.40	14.19	10.52	14.42	14.42	13.94	14.18	14.18	-0.24	-0.24	0.00
08-Dec	D	HRS	12.20	11.10	15.06	11.08	15.30	15.52	14.91	15.14	15.36	-0.24	-0.45	-0.22
10-Dec	D	HRS	10.60	9.77	14.50	9.94	14.36	14.06	14.14	14.03	13.74	0.11	0.40	0.29

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
11-Dec	D	HRS	8.00	7.71	15.98	7.83	16.30	16.28	15.24	15.56	15.54	-0.33	-0.31	0.02
11-Dec	D	HRS	10.70	9.91	14.44	10.08	14.80	14.42	14.11	14.48	14.11	-0.38	-0.01	0.37
11-Dec	D	HRS	11.20	9.98	14.68	10.27	14.42	14.16	14.35	14.14	13.89	0.21	0.46	0.25
13-Dec	D	HRS	8.00	7.85	15.94	7.79	15.93	15.96	15.22	15.20	15.23	0.02	-0.01	-0.03
13-Dec	D	HRS	12.30	11.22	13.43	11.05	13.16	13.56	13.31	13.02	13.42	0.29	-0.10	-0.40
13-Dec	D	HRS	11.70	10.67	14.10	10.51	13.76	13.72	13.89	13.53	13.49	0.36	0.40	0.04
15-Dec	D	HRS	11.10	10.74	15.47	10.26	15.40	15.04	15.25	15.10	14.75	0.15	0.50	0.35
15-Dec	D	HRS	9.70	9.32	14.75	9.11	14.38	14.20	14.31	13.92	13.75	0.39	0.57	0.17
17-Dec	D	HRS	10.60	9.93	14.95	10.00	14.67	14.64	14.61	14.34	14.31	0.26	0.29	0.03
17-Dec	D	HRS	11.10	10.21	14.75	10.27	14.84	15.00	14.46	14.55	14.71	-0.10	-0.25	-0.16
18-Dec	D	HRS	10.20	19.68	14.96	9.55	14.76	14.74	16.39	14.36	14.34	2.03	2.05	0.02
18-Dec	D	HRS	9.20	8.99	15.53	9.02	15.30	15.24	15.02	14.80	14.74	0.22	0.28	0.06
18-Dec	D	HRS	10.60	9.99	14.53	10.18	14.37	14.17	14.21	14.08	13.88	0.13	0.32	0.20
18-Dec	D	HRS	10.80	9.90	14.53	10.13	14.24	14.05	14.19	13.94	13.76	0.25	0.43	0.19
18-Dec	D	HRS	10.40	9.92	14.77	10.11	14.60	14.65	14.43	14.29	14.34	0.14	0.09	-0.05
18-Dec	D	HRS	10.20	9.75	14.79	9.81	14.63	14.40	14.42	14.27	14.05	0.15	0.37	0.22
18-Dec	E	HRS	11.10	11.03	13.94	10.25	14.11	13.88	13.79	13.83	13.61	-0.05	0.18	0.23
18-Dec	E	HRS	11.30	11.03	14.33	10.52	14.16	13.97	14.17	13.93	13.74	0.25	0.43	0.19
19-Dec	D	HRS	12.20	10.68	14.19	10.99	14.00	14.02	13.98	13.84	13.86	0.14	0.12	-0.02
19-Dec	E	HRS	11.00	10.75	13.93	10.34	13.66	13.69	13.73	13.41	13.44	0.33	0.30	-0.03
19-Dec	E	HRS	11.00	10.87	14.33	10.57	14.07	13.80	14.15	13.85	13.58	0.30	0.57	0.27
19-Dec	D	HRS	9.20	8.73	15.39	8.84	15.52	15.49	14.84	14.98	14.95	-0.14	-0.11	0.03

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
19-Dec	D	HRS	10.10	9.20	15.29	9.41	15.06	15.44	14.82	14.63	15.00	0.19	-0.18	-0.37
19-Dec	D	HRS	10.50	9.65	14.96	8.62	14.91	15.00	14.57	14.36	14.45	0.21	0.13	-0.09
19-Dec	D	HRS	11.10	9.68	13.60	9.76	13.58	13.56	13.25	13.24	13.22	0.01	0.03	0.02
22-Dec	D	HRS	10.40	10.19	14.57	10.30	14.33	14.20	14.28	14.06	13.93	0.22	0.35	0.13
22-Dec	D	HRS	7.70	8.17	15.16	8.18	14.91	14.92	14.53	14.29	14.30	0.24	0.23	-0.01
22-Dec	D	HRS	7.60	8.00	16.03	7.97	15.90	16.00	15.33	15.20	15.30	0.13	0.03	-0.10
22-Dec	D	HRS	11.60	10.37	13.65	10.25	13.27	13.52	13.40	13.01	13.26	0.39	0.15	-0.25
22-Dec	D	HRS	13.20	11.04	13.76	11.30	13.72	13.60	13.61	13.61	13.49	0.00	0.12	0.12
22-Dec	D	HRS	12.80	11.95	14.35	11.59	14.23	14.48	14.34	14.16	14.41	0.18	-0.07	-0.25
22-Dec	D	HRS	12.70	12.08	14.37	11.46	14.48	14.64	14.38	14.39	14.55	-0.01	-0.17	-0.16
22-Dec	D	HRS	12.00	11.47	14.72	11.03	14.50	14.68	14.63	14.34	14.52	0.29	0.11	-0.18
26-Dec	E	HRS	11.30	10.38	14.86	10.35	14.71	14.30	14.40	14.44	14.04	-0.04	0.36	0.40
26-Dec	E	HRS	11.00	10.18	14.62	10.32	14.33	14.25	14.32	14.06	13.98	0.26	0.34	0.08
29-Dec	D	HRS	9.80	9.60	14.63	9.55	14.36	14.08	14.24	13.97	13.70	0.27	0.54	0.27
29-Dec	D	HRS	11.20	10.38	14.15	10.26	14.33	14.28	13.89	14.05	14.00	-0.16	-0.11	0.05
29-Dec	D	HRS	12.70	11.52	15.39	11.51	14.93	14.96	15.31	14.85	14.88	0.46	0.43	-0.03
29-Dec	D	HRS	8.60	8.38	13.32	8.39	13.49	13.05	12.79	12.96	12.54	-0.16	0.26	0.42
29-Dec	D	HRS	12.50	11.60	14.22	11.09	13.87	13.90	14.16	13.73	13.76	0.43	0.40	-0.03
29-Dec	D	HRS	11.60	11.09	14.54	11.09	14.27	14.12	14.39	14.12	13.98	0.27	0.42	0.15
30-Dec	D	HRS	12.60	10.94	15.07	11.26	14.86	14.93	14.89	14.74	14.81	0.15	0.09	-0.07
			10.99	10.43	14.53	10.17	14.40	14.37	14.28	14.11	14.07	0.17	0.21	0.04

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

DATE	E/D	CL	HM-E	NM-E	NP-E	NM-F	NP-F	KP-F	12% m.b. NP-E	12% m.b. NP-F	12% m.b. KP-F	DIFFERENCES NPE-NPF	DIFFERENCES NPE-KPF	DIFFERENCES NPF-KPF
02-Jan	D	HRS	10.50	10.00	14.83	9.97	14.51	14.52	14.50	14.18	14.19	0.32	0.31	-0.01
02-Jan	D	HRS	9.20	8.99	14.47	8.68	14.34	14.00	13.99	13.82	13.49	0.17	0.50	0.33
05-Jan	D	HRS	13.00	11.33	15.13	11.73	15.27	15.48	15.02	15.22	15.43	-0.21	-0.42	-0.21
05-Jan	D	HRS	11.00	10.73	15.50	10.62	15.69	15.60	15.28	15.45	15.36	-0.17	-0.08	0.09
06-Jan	D	HRS	10.10	9.62	15.03	9.35	15.40	15.04	14.63	14.95	14.60	-0.32	0.03	0.35
06-Jan	D	HRS	9.60	9.18	14.22	8.94	14.27	13.84	13.78	13.79	13.37	-0.01	0.40	0.42
06-Jan	D	HRS	12.00	11.46	14.16	11.00	14.42	14.36	14.07	14.26	14.20	-0.18	-0.13	0.06
06-Jan	D	HRS	12.80	12.02	13.80	11.57	14.03	14.04	13.80	13.96	13.97	-0.16	-0.17	-0.01
07-Jan	D	HRS	11.40	11.12	14.05	10.69	14.12	14.08	13.91	13.91	13.87	0.00	0.04	0.04
07-Jan	E	HRS	10.60	10.63	14.46	10.04	14.62	14.60	14.24	14.30	14.28	-0.06	-0.04	0.02
07-Jan	E	HRS	10.70	10.55	15.10	10.16	14.88	14.80	14.86	14.58	14.50	0.28	0.36	0.08
07-Jan	D	HRS	12.20	11.83	14.06	11.10	14.31	14.40	14.03	14.17	14.25	-0.13	-0.22	-0.09
07-Jan	D	HRS	10.00	9.61	14.13	9.61	14.39	14.12	13.76	14.01	13.75	-0.25	0.01	0.26
08-Jan	D	HRS	11.20	10.45	13.[illegible]3	10.47	13.80	13.72	13.64	13.56	13.49	0.08	0.15	0.08
08-Jan	D	HRS	11.30	10.48	13.38	10.43	13.62	13.41	13.15	13.38	13.17	-0.23	-0.02	0.21
08-Jan	D	HRS	11.00	10.08	14.29	10.03	14.34	14.12	13.98	14.03	13.81	-0.04	0.17	0.22
08-Jan	D	HRS	10.20	9.66	14.08	9.30	14.14	14.20	13.72	13.72	13.78	0.00	-0.06	-0.06
08-Jan	E	HRS	12.30	10.94	14.81	11.28	14.96	14.86	14.63	14.84	14.74	-0.20	-0.11	0.10
08-Jan	E	HRS	11.90	10.70	14.77	10.82	14.59	14.64	14.55	14.40	14.45	0.16	0.11	-0.05
09-Jan	E	HRS	11.10	9.94	15.04	10.14	15.12	14.70	14.70	14.81	14.40	-0.11	0.30	0.41
09-Jan	D	HRS	11.20	10.25	15.74	10.55	15.46	15.60	15.43	15.21	15.35	0.22	0.09	-0.14

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

									12% m.b.			DIFFERENCES	
DATE	E/D	CL	MM-E	MM-E	NP-E	MM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
12-Jan	E	HRS	11.50	10.33	13.94	10.70	13.96	13.72	13.68	13.78	13.52	-0.10	0.16	0.26
12-Jan	E	HRS	11.40	10.37	14.56	10.45	14.44	14.44	14.30	14.19	14.19	0.11	0.11	0.00
12-Jan	D	HRS	9.00	8.72	15.30	9.06	14.99	14.92	14.75	14.51	14.44	0.24	0.31	0.07
12-Jan	D	HRS	9.30	8.96	14.37	9.09	13.99	13.64	13.89	13.54	13.20	0.35	0.69	0.34
12-Jan	D	HRS	11.00	10.44	14.25	10.40	14.34	14.20	14.00	14.08	13.95	-0.08	0.06	0.14
12-Jan	D	HRS	11.20	10.59	14.70	10.55	14.54	14.44	14.47	14.30	14.21	0.16	0.26	0.10
12-Jan	D	HRS	11.90	10.97	14.56	10.83	14.31	14.32	14.39	14.12	14.13	0.27	0.26	-0.01
12-Jan	D	HRS	11.50	10.78	14.26	10.47	14.20	14.08	14.07	13.96	13.84	0.11	0.23	0.12
13-Jan	E	HRS	10.50	9.85	14.20	9.72	14.21	13.92	13.86	13.85	13.57	0.01	0.29	0.28
13-Jan	E	HRS	10.50	9.86	14.03	9.90	14.01	13.70	13.70	13.68	13.38	0.01	0.32	0.30
13-Jan	D	HRS	10.60	9.82	14.47	9.83	14.01	13.92	14.12	13.67	13.58	0.45	0.54	0.09
13-Jan	D	HRS	10.60	9.99	14.14	9.98	14.19	13.92	13.82	13.87	13.61	-0.05	0.22	0.26
13-Jan	D	HRS	10.80	10.28	13.63	9.86	13.76	13.52	13.37	13.43	13.20	-0.06	0.17	0.23
13-Jan	D	HRS	10.90	10.41	14.01	10.23	13.94	14.04	13.76	13.67	13.76	0.10	0.00	-0.10
14-Jan	D	HRS	10.70	10.04	14.44	9.83	14.33	14.52	14.13	13.99	14.17	0.14	-0.05	-0.18
14-Jan	D	HRS	10.70	10.04	14.13	9.95	14.15	14.00	13.82	13.83	13.68	-0.01	0.14	0.15
14-Jan	D	HRS	7.90	7.94	15.61	7.96	15.42	15.25	14.92	14.74	14.58	0.18	0.34	0.16
14-Jan	D	HRS	10.40	10.12	15.04	9.78	15.08	14.88	14.73	14.71	14.51	0.02	0.21	0.20
14-Jan	E	HRS	11.40	10.84	14.52	10.42	14.59	14.34	14.33	14.33	14.09	0.00	0.24	0.25
21-Jan	D	HRS	10.30	9.88	15.32	9.84	15.41	15.52	14.96	15.04	15.15	-0.08	-0.19	-0.11
22-Jan	D	HRS	9.80	9.32	15.28	9.35	15.41	15.52	14.83	14.96	15.07	-0.13	-0.24	-0.11
22-Jan	D	HRS	10.40	10.04	15.37	9.81	15.02	15.04	15.04	14.66	14.67	0.38	0.36	-0.02

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

										12% m.b.		DIFFERENCES		
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
26-Jan	E	HRS	10.50	9.87	14.23	9.79	13.82	13.88	13.89	13.48	13.54	0.41	0.35	-0.06
26-Jan	E	HRS	10.80	10.42	14.70	10.01	14.11	13.96	14.44	13.80	13.65	0.64	0.79	0.15
26-Jan	E	HRS	10.90	10.47	14.20	10.07	14.19	14.17	13.96	13.89	13.87	0.07	0.09	0.02
27-Jan	D	HRS	13.20	11.52	13.78	11.13	14.18	14.22	13.71	14.04	14.08	-0.34	-0.30	-0.04
27-Jan	E	HRS	10.90	10.24	14.44	10.12	14.50	14.38	14.16	14.20	14.08	-0.04	0.08	0.12
27-Jan	D	HRS	12.90	11.53	14.32	11.53	14.60	14.86	14.24	14.52	14.78	-0.28	-0.54	-0.26
27-Jan	D	HRS	10.30	10.24	14.43	10.22	14.46	14.30	14.15	14.17	14.02	-0.03	0.13	0.16
27-Jan	E	HRS	10.70	10.51	14.28	9.99	14.13	13.82	14.04	13.81	13.51	0.23	0.53	0.30
27-Jan	E	HRS	10.30	10.31	13.74	9.56	13.50	13.30	13.48	13.14	12.94	0.35	0.54	0.19
27-Jan	D	HRS	11.20	10.31	13.86	9.97	13.53	13.39	13.60	13.22	13.09	0.37	0.51	0.14
27-Jan	D	HRS	11.20	10.38	14.02	10.00	14.08	13.98	13.77	13.77	13.67	0.00	0.10	0.10
28-Jan	D	HRS	12.20	11.49	13.74	10.88	13.72	13.98	13.66	13.55	13.81	0.11	-0.15	-0.26
28-Jan	D	HRS	10.60	9.44	14.28	9.17	14.07	13.86	13.88	13.63	13.43	0.24	0.45	0.20
28-Jan	D	HRS	10.90	10.28	14.45	10.06	14.39	14.48	14.17	14.08	14.17	0.09	0.01	-0.09
29-Jan	D	HRS	12.30	10.72	13.89	10.80	13.64	13.41	13.69	13.46	13.23	0.23	0.46	0.23
30-Jan	D	HRS	11.60	10.85	14.21	10.29	14.00	14.16	14.03	13.73	13.89	0.29	0.14	-0.16
30-Jan	D	HRS	9.80	9.66	13.21	9.26	13.16	13.27	12.87	12.76	12.87	0.11	0.00	-0.11
30-Jan	D	HRS	9.30	9.25	15.53	9.16	15.25	15.13	15.06	14.77	14.66	0.29	0.40	0.12
			10.91	10.27	14.43	10.11	14.39	14.30	14.15	14.09	14.00	0.06	0.15	0.09
02-Feb	D	HRS	9.60	9.27	14.84	8.95	14.86	14.84	14.39	14.36	14.34	0.03	0.05	0.02

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TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

									12% m.b.			DIFFERENCES		
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
02-Feb	D	HRS	9.50	8.91	14.98	8.71	15.06	14.86	14.38	14.52	14.32	-0.14	0.05	0.19
02-Feb	D	HRS	9.20	9.00	14.93	8.61	14.89	14.85	14.44	14.34	14.30	0.10	0.14	0.04
02-Feb	D	HRS	9.90	9.55	14.75	9.20	14.85	14.87	14.35	14.39	14.41	-0.04	-0.06	-0.02
04-Feb	E	HRS	11.60	10.37	14.34	10.29	14.02	14.14	14.08	13.75	13.87	0.33	0.21	-0.12
04-Feb	E	HRS	11.60	10.30	13.93	9.96	14.45	14.18	13.67	14.12	13.86	-0.46	-0.19	0.26
04-Feb	D	HRS	11.10	10.28	14.50	10.06	14.51	14.30	14.22	14.20	13.99	0.03	0.23	0.21
04-Feb	D	HRS	11.30	10.26	14.43	10.13	14.48	14.46	14.15	14.18	14.16	-0.03	-0.01	0.02
04-Feb	D	HRS	11.60	10.43	14.77	10.38	14.88	14.78	14.51	14.61	14.51	-0.10	0.00	0.10
04-Feb	E	HRS	11.60	10.43	14.18	10.83	14.19	14.18	13.93	14.00	13.99	-0.07	-0.06	0.01
04-Feb	E	HRS	11.90	10.92	14.29	10.43	14.36	14.16	14.12	14.11	13.91	0.01	0.20	0.20
04-Feb	D	HRS	11.90	10.07	14.29	10.64	14.09	14.12	13.98	13.88	13.91	0.11	0.08	-0.03
06-Feb	E	HRS	10.40	10.32	14.09	9.80	14.09	13.99	13.83	13.75	13.65	0.08	0.18	0.10
05-Feb	E	HRS	11.60	10.65	14.48	10.23	14.24	14.10	14.26	13.96	13.82	0.30	0.44	0.14
13-Feb	E	HRS	12.00	10.75	14.23	10.78	13.65	13.64	14.03	13.46	13.45	0.57	0.58	0.01
13-Feb	E	HRS	11.40	10.58	14.21	9.99	14.07	14.04	13.98	13.76	13.73	0.23	0.26	0.03
17-Feb	E	HRS	11.10	10.34	14.00	9.92	13.99	13.98	13.74	13.67	13.66	0.07	0.08	0.01
17-Feb	E	HRS	11.00	10.11	13.88	10.06	13.85	13.98	13.59	13.55	13.68	0.04	-0.09	-0.13
17-Feb	D	HRS	12.60	11.23	15.06	11.18	15.11	15.38	14.93	14.97	15.24	-0.04	-0.31	-0.27
17-Feb	D	HRS	12.30	11.11	15.12	10.83	14.94	15.10	14.97	14.74	14.90	0.22	0.07	-0.16
17-Feb	D	HRS	11.90	11.12	15.01	10.49	15.21	15.38	14.86	14.95	15.12	-0.09	-0.26	-0.17
17-Feb	D	HRS	12.10	11.22	15.07	10.49	15.14	15.18	14.94	14.88	14.92	0.05	0.01	-0.04
18-Feb	D	HRS	11.60	10.81	13.86	10.65	13.86	13.82	13.69	13.65	13.61	0.04	0.08	0.04

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

										12% s.b.			DIFFERENCES	
DATE	E/D	CL	NH-E	NH-E	NP-E	NH-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
18-Feb	D	HRS	11.50	10.79	14.13	10.58	13.92	14.02	13.94	13.70	13.80	0.24	0.14	-0.10
18-Feb	E	HRS	11.30	10.41	14.33	10.11	14.30	14.16	14.08	14.00	13.86	0.08	0.21	0.14
18-Feb	E	HRS	11.00	10.31	14.15	10.10	14.10	13.90	13.88	13.80	13.61	0.08	0.28	0.20
19-Feb	E	HRS	11.60	10.42	15.02	10.35	14.55	14.30	14.76	14.28	14.04	0.47	0.72	0.25
19-Feb	E	HRS	11.30	10.67	14.79	10.39	14.43	14.20	14.57	14.17	13.94	0.40	0.62	0.23
20-Feb	D	HRS	10.60	10.02	14.39	9.94	14.16	13.96	14.07	13.84	13.64	0.24	0.43	0.20
20-Feb	D	HRS	10.40	9.73	14.29	9.76	14.12	14.00	13.93	13.77	13.65	0.16	0.28	0.12
20-Feb	D	HRS	10.50	9.93	14.23	9.96	13.80	13.72	13.90	13.48	13.41	0.42	0.49	0.08
20-Feb	D	HRS	10.10	9.59	14.07	9.40	13.82	13.74	13.69	13.42	13.35	0.27	0.35	0.08
23-Feb	E	HRS	11.30	10.42	14.51	10.27	14.50	14.20	14.25	14.22	13.93	0.03	0.33	0.29
23-Feb	D	HRS	8.80	9.35	14.46	9.14	14.11	14.00	14.03	13.67	13.56	0.36	0.47	0.11
24-Feb	E	HRS	11.60	10.61	15.06	10.36	15.00	14.80	14.83	14.73	14.53	0.10	0.30	0.20
24-Feb	E	HRS	10.90	10.01	14.43	9.77	14.50	14.30	14.11	14.14	13.95	-0.03	0.16	0.20
24-Feb	D	HRS	11.90	11.16	15.38	10.68	15.36	15.38	15.23	15.13	15.15	0.10	0.08	-0.02
24-Feb	D	HRS	11.30	10.11	14.39	10.01	14.27	14.04	14.09	13.95	13.73	0.13	0.36	0.22
24-Feb	D	HRS	10.90	10.20	14.52	9.95	14.16	14.13	14.23	13.84	13.81	0.39	0.42	0.03
24-Feb	D	HRS	11.10	10.27	14.27	10.02	14.04	13.82	13.99	13.73	13.52	0.26	0.48	0.22
23-Feb	D	HRS	10.80	9.99	14.43	9.83	14.55	14.44	14.11	14.20	14.09	-0.09	0.02	0.11
23-Feb	D	HRS	10.50	9.94	14.30	9.53	14.11	14.00	13.97	13.72	13.62	0.25	0.36	0.11
24-Feb	D	HRS	11.40	10.51	14.13	10.01	14.12	13.82	13.89	13.81	13.51	0.09	0.38	0.29
25-Feb	D	HRS	11.60	10.42	14.25	10.29	14.38	14.22	14.00	14.11	13.95	-0.11	0.05	0.16
25-Feb	D	HRS	11.30	11.14	13.94	9.91	13.82	13.54	13.81	13.50	13.23	0.31	0.58	0.27

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

									12% m.b.		DIFFERENCES		
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
25-Feb	D	HRS	12.40	10.87	13.91	10.47	13.84	13.82	13.73	13.60	13.58	0.13	0.15	0.02
25-Feb	D	HRS	12.10	10.65	14.42	10.51	14.14	14.04	14.20	13.90	13.81	0.30	0.40	0.10
26-Feb	D	HRS	10.90	10.36	14.63	9.68	14.72	14.68	14.36	14.34	14.30	0.02	0.06	0.04
26-Feb	D	HRS	10.80	10.27	14.48	9.62	14.94	14.92	14.20	14.55	14.53	-0.35	-0.33	0.02
26-Feb	D	HRS	9.70	9.42	14.09	8.96	14.27	13.96	13.69	13.79	13.49	-0.10	0.19	0.30
27-Feb	D	HRS	9.70	9.12	14.63	9.22	14.47	14.52	14.17	14.03	14.08	0.14	0.09	-0.05
27-Feb	D	HRS	9.30	9.26	14.56	9.08	14.58	14.68	14.11	14.11	14.21	0.00	-0.10	-0.10
			11.07	10.27	14.45	10.01	14.38	14.30	14.17	14.06	13.99	0.11	0.19	0.08
02-Mar	D	HRS	12.10	11.46	12.11	10.72	12.20	12.06	12.04	12.03	11.89	0.01	0.15	0.14
02-Mar	D	HRS	9.30	9.18	14.22	8.80	14.45	14.48	13.78	13.94	13.97	-0.16	-0.19	-0.03
02-Mar	D	HRS	9.20	9.05	15.56	8.06	15.10	15.72	15.08	14.58	15.18	0.48	-0.12	-0.60
03-Mar	D	HRS	11.00	10.42	14.50	10.09	14.44	14.36	14.24	14.13	14.05	0.11	0.19	0.08
03-Mar	E	HRS	11.80	10.73	14.70	10.57	14.64	14.72	14.49	14.41	14.48	0.08	0.01	-0.08
04-Mar	E	HRS	11.40	10.63	14.61	10.31	14.63	14.30	14.39	14.35	14.03	0.03	0.36	0.32
04-Mar	D	HRS	8.80	8.63	15.35	8.55	15.43	15.16	14.78	14.85	14.59	-0.06	0.20	0.26
04-Mar	D	HRS	10.10	10.02	13.71	9.72	13.72	13.45	13.41	13.37	13.11	0.03	0.30	0.26
05-Mar	D	HRS	11.80	11.16	13.75	11.56	13.33	13.60	13.62	13.26	13.53	0.36	0.09	-0.27
06-Mar	D	HRS	9.00	8.73	14.71	8.61	14.51	14.56	14.18	13.97	14.02	0.21	0.16	-0.05
06-Mar	D	HRS	9.40	9.44	14.46	9.14	14.52	14.44	14.05	14.06	13.98	-0.01	0.07	0.08
08-Mar	D	HRS	11.00	10.73	13.98	10.20	13.74	13.72	13.76	13.46	13.44	0.30	0.32	0.02

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

DATE	E/D	CL	KM-E	NM-E	NP-E	NM-F	NP-F	KP-F	12% m.b. NP-E	 NP-F	 KP-F	DIFFERENCES NPE-NPF	 NPE-KPF	 NPF-KPF
08-Mar	D	HRS	10.60	10.48	15.24	9.91	15.13	14.92	14.98	14.78	14.57	0.20	0.41	0.21
08-Mar	D	HRS	9.90	9.89	14.65	9.58	14.52	14.26	14.31	14.13	13.88	0.18	0.43	0.25
11-Mar	E	HRS	10.00	9.34	15.93	9.33	15.85	15.32	15.46	15.19	14.87	0.27	0.59	0.32
11-Mar	E	HRS	11.20	10.35	15.67	9.96	15.58	15.72	15.38	15.23	15.36	0.15	0.02	-0.14
11-Mar	D	HRS	10.00	9.42	14.16	9.29	13.93	13.68	13.76	13.51	13.27	0.24	0.49	0.24
11-Mar	D	HRS	9.40	9.12	14.42	9.07	14.29	14.12	13.96	13.83	13.67	0.13	0.30	0.16
11-Mar	D	HRS	10.30	9.80	14.52	9.97	14.17	14.02	14.17	13.85	13.70	0.32	0.46	0.15
11-Mar	D	HRS	10.30	9.82	14.45	9.79	14.08	14.08	14.10	13.74	13.74	0.37	0.37	0.00
11-Mar	D	HRS	10.30	9.69	14.72	9.87	14.38	14.20	14.34	14.02	13.86	0.32	0.48	0.16
11-Mar	D	HRS	10.30	9.98	14.18	10.31	13.58	13.60	13.86	13.32	13.34	0.54	0.52	-0.02
13-Mar	D	HRS	9.60	9.38	14.46	8.42	13.94	13.96	14.04	13.40	13.41	0.65	0.63	-0.02
13-Mar	D	HRS	9.80	9.38	13.09	9.06	12.94	12.97	12.71	12.52	12.55	0.19	0.16	-0.03
13-Mar	D	HRS	10.30	10.26	14.26	9.54	14.04	14.12	13.98	13.66	13.74	0.33	0.25	-0.08
16-Mar	D	HRS	10.80	10.65	14.14	9.88	14.40	14.48	13.93	14.06	14.14	-0.13	-0.21	-0.08
16-Mar	D	HRS	10.20	10.05	15.71	9.71	15.68	16.20	15.37	15.28	15.79	0.09	-0.42	-0.51
18-Mar	D	HRS	9.30	9.30	14.36	8.85	14.36	14.26	13.93	13.86	13.77	0.07	0.17	0.10
18-Mar	D	HRS	11.30	10.62	14.34	9.98	14.18	14.00	14.12	13.86	13.69	0.26	0.43	0.18
19-Mar	D	HRS	12.20	11.16	13.61	11.10	13.21	13.60	13.48	13.08	13.46	0.41	0.02	-0.39
19-Mar	D	HRS	11.80	11.13	14.04	11.05	14.04	14.24	13.90	13.89	14.09	0.01	-0.19	-0.20
19-Mar	D	HRS	10.20	9.66	13.72	9.48	13.52	13.49	13.36	13.14	13.11	0.22	0.25	0.03
20-Mar	D	HRS	10.40	10.12	14.78	10.20	14.81	14.94	14.47	14.51	14.64	-0.04	-0.17	-0.13
20-Mar	D	HRS	10.10	9.97	13.33	9.99	13.14	12.85	13.03	12.85	12.56	0.18	0.47	0.28

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
20-Mar	D	HRS	11.40	10.51	14.64	10.33	14.63	14.28	14.40	14.36	14.01	0.04	0.38	0.34
20-Mar	D	HRS	9.00	8.79	13.35	8.82	12.92	12.62	12.88	12.47	12.18	0.41	0.70	0.29
20-Mar	D	HRS	9.20	8.95	14.80	8.91	14.50	14.40	14.30	14.01	13.91	0.30	0.39	0.10
23-Mar	D	HRS	9.80	9.13	15.79	9.14	15.34	15.48	15.29	14.86	14.99	0.43	0.30	-0.14
23-Mar	D	HRS	9.40	8.93	14.17	8.79	14.03	13.76	13.69	13.54	13.28	0.16	0.42	0.26
23-Mar	D	HRS	8.50	8.07	14.95	8.56	15.16	14.92	14.31	14.59	14.36	-0.28	-0.05	0.23
23-Mar	D	HRS	12.10	11.24	13.60	10.82	13.64	13.56	13.48	13.46	13.38	0.02	0.10	0.08
23-Mar	D	HRS	11.40	11.04	13.75	10.80	13.39	13.49	13.60	13.21	13.31	0.39	0.29	-0.10
23-Mar	E	HRS	11.30	10.26	14.20	10.20	14.17	14.04	13.92	13.89	13.76	0.04	0.17	0.13
23-Mar	E	HRS	10.80	10.15	14.18	10.06	13.83	13.80	13.89	13.53	13.50	0.36	0.39	0.03
24-Mar	D	HRS	10.80	9.99	14.74	9.98	14.74	14.44	14.41	14.41	14.12	0.00	0.29	0.29
24-Mar	E	HRS	11.00	10.18	13.87	10.06	13.74	13.45	13.59	13.44	13.16	0.15	0.43	0.28
24-Mar	E	HRS	11.10	10.47	14.11	10.31	13.84	13.76	13.87	13.58	13.50	0.29	0.37	0.08
24-Mar	D	HRS	10.60	10.10	14.29	9.75	14.38	14.00	13.99	14.02	13.65	-0.03	0.34	0.37
24-Mar	D	HRS	9.50	9.27	15.14	9.05	14.84	14.64	14.68	14.36	14.17	0.33	0.52	0.19
24-Mar	D	HRS	9.20	9.20	14.70	8.82	14.63	14.12	14.25	14.12	13.63	0.13	0.62	0.49
24-Mar	D	HRS	8.40	8.43	15.28	8.18	14.98	14.86	14.68	14.36	14.24	0.33	0.44	0.12
25-Mar	D	HRS	8.40	8.25	12.35	8.25	11.97	11.50	11.85	11.48	11.03	0.36	0.82	0.46
25-Mar	D	HRS	8.90	8.78	14.19	8.64	14.11	13.84	13.69	13.59	13.33	0.10	0.36	0.26
26-Mar	D	HRS	10.00	9.43	15.19	9.27	15.28	14.68	14.76	14.82	14.24	-0.06	0.52	0.58
26-Mar	D	HRS	10.20	9.59	14.70	9.33	14.42	14.10	14.31	14.00	13.68	0.31	0.62	0.31
27-Mar	D	HRS	9.20	9.11	15.33	8.58	15.42	15.48	14.84	14.84	14.90	0.00	-0.06	-0.06

TABLE VIII - FIELD OFFICE PROTEIN COMPARISON (MONTH)

									12% m.b.		DIFFERENCES		
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
30-Mar	D	HRS	12.30	10.74	14.08	10.93	13.80	13.96	13.88	13.63	13.79	0.25	0.09	-0.16
30-Mar	D	HRS	12.10	10.74	13.96	10.84	13.48	13.72	13.76	13.30	13.54	0.46	0.22	-0.24
30-Mar	D	HRS	10.20	9.72	14.06	9.91	13.88	13.64	13.70	13.56	13.32	0.15	0.38	0.23
30-Mar	D	HRS	10.20	9.84	13.98	9.69	13.75	13.64	13.65	13.40	13.29	0.25	0.35	0.11
30-Mar	D	HRS	10.10	9.45	13.91	9.68	13.63	13.60	13.52	13.28	13.25	0.24	0.27	0.03
30-Mar	D	HRS	10.30	9.43	14.09	9.38	14.03	13.88	13.69	13.62	13.48	0.07	0.21	0.15
			10.29	9.83	14.37	9.65	14.21	14.12	14.02	13.84	13.75	0.19	0.27	0.09
01-Apr	D	HRS	10.50	9.71	13.84	9.61	13.90	13.49	13.49	13.53	13.13	-0.04	0.36	0.40
01-Apr	D	HRS	11.60	10.02	13.84	10.23	13.87	13.37	13.54	13.60	13.11	-0.06	0.43	0.49
01-Apr	D	HRS	10.90	9.73	13.80	9.70	13.55	13.60	13.45	13.20	13.25	0.25	0.20	-0.05
			11.00	9.82	13.83	9.85	13.77	13.49	13.49	13.44	13.16	0.05	0.33	0.28
			10.81	10.19	14.44	9.98	14.34	14.26	14.15	14.01	13.94	0.13	0.21	0.08

KEY:

E/D Export/Domestic shipment

CL = Wheat class hard red spring (HRS)
MM-E = Motomco moisture percent-export elevator
NM-E = NIR moisture percent-export elevator
NP-E or NPE = NIR protein export elevator
NM-F = NIR moisture percent-field office
NP-F or NPF = NIR protein field office
KP-F or KPF = Kjeldahl protein field office
%12% m.b. = 12 percent moisture basis

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.			DIFFERENCES		
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
02-Dec	E	HRS	12.30	11.07	14.21	10.44	13.76	13.88	14.06	13.52	13.64	0.54	0.42	-0.12
03-Dec	E	HRS	10.80	10.16	14.31	10.36	13.94	13.88	14.02	13.68	13.63	0.33	0.39	0.06
03-Dec	E	HRS	13.00	11.27	14.41	11.32	14.13	14.14	14.29	14.02	14.03	0.27	0.26	-0.01
04-Dec	E	HRS	11.30	10.45	14.22	10.48	14.02	13.88	13.97	13.78	13.64	0.19	0.33	0.14
05-Dec	E	HRS	11.50	10.33	13.87	10.47	14.23	14.00	13.61	13.99	13.76	-0.38	-0.15	0.23
05-Dec	E	HRS	11.20	10.77	13.77	10.27	13.30	13.37	13.58	13.04	13.11	0.54	0.47	-0.07
05-Dec	E	HRS	11.20	10.97	13.77	10.00	13.89	13.74	13.61	13.58	13.43	0.03	0.18	0.15
08-Dec	E	HRS	11.60	10.51	14.44	10.52	14.44	14.40	14.20	14.20	14.16	0.00	0.04	0.04
08-Dec	E	HRS	11.30	10.95	14.52	10.58	14.67	14.85	14.35	14.44	14.61	-0.09	-0.27	-0.18
08-Dec	E	HRS	11.30	10.40	14.19	10.52	14.42	14.42	13.94	14.18	14.18	-0.24	-0.24	0.00
18-Dec	E	HRS	11.30	11.03	14.33	10.52	14.16	13.97	14.17	13.93	13.74	0.25	0.43	0.19
18-Dec	E	HRS	11.10	11.03	13.94	10.25	14.11	13.88	13.79	13.83	13.61	-0.05	0.18	0.23
19-Dec	E	HRS	11.00	10.67	14.33	10.57	14.07	13.80	14.15	13.85	13.58	0.30	0.57	0.27
19-Dec	E	HRS	11.00	10.75	13.93	10.34	13.66	13.69	13.73	13.41	13.44	0.33	0.30	-0.03
26-Dec	E	HRS	11.30	10.38	14.66	10.35	14.71	14.30	14.40	14.44	14.04	-0.04	0.36	0.40
26-Dec	E	HRS	11.00	10.18	14.62	10.32	14.33	14.25	14.32	14.06	13.98	0.26	0.34	0.08
			11.39	10.70	14.22	10.46	14.12	14.03	14.01	13.87	13.79	0.14	0.23	0.09
07-Jan	E	HRS	10.70	10.55	15.10	10.16	14.88	14.80	14.86	14.58	14.50	0.28	0.36	0.08
07-Jan	E	HRS	10.60	10.63	14.46	10.04	14.62	14.60	14.24	14.30	14.28	-0.06	-0.04	0.02
08-Jan	E	HRS	12.30	10.94	14.81	11.28	14.96	14.86	14.63	14.84	14.74	-0.20	-0.11	0.10

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TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.			DIFFERENCES		
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
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08-Jan	E	HRS	11.90	10.70	14.77	10.82	14.59	14.64	14.56	14.40	14.45	0.16	0.11	-0.05
09-Jan	E	HRS	11.10	9.94	15.04	10.14	15.12	14.70	14.70	14.81	14.40	-0.11	0.30	0.41
12-Jan	E	HRS	11.40	10.37	14.56	10.45	14.44	14.44	14.30	14.19	14.19	0.11	0.11	0.00
12-Jan	E	HRS	11.50	10.33	13.94	10.70	13.98	13.72	13.68	13.78	13.52	-0.10	0.16	0.26
13-Jan	E	HRS	10.50	9.85	14.20	9.72	14.21	13.92	13.86	13.85	13.57	0.01	0.29	0.28
13-Jan	E	HRS	10.50	9.86	14.03	9.90	14.01	13.70	13.70	13.68	13.38	0.01	0.32	0.30
14-Jan	E	HRS	11.40	10.84	14.52	10.42	14.59	14.34	14.33	14.33	14.09	0.00	0.24	0.25
26-Jan	E	HRS	10.80	10.42	14.70	10.01	14.11	13.96	14.44	13.80	13.65	0.64	0.79	0.15
26-Jan	E	HRS	10.50	9.87	14.23	9.79	13.82	13.88	13.89	13.48	13.54	0.41	0.35	-0.06
26-Jan	E	HRS	10.90	10.47	14.20	10.07	14.19	14.17	13.96	13.89	13.87	0.07	0.09	0.02
27-Jan	E	HRS	10.70	10.51	14.28	9.99	14.13	13.82	14.04	13.81	13.51	0.23	0.53	0.30
27-Jan	E	HRS	10.90	10.24	14.44	10.12	14.50	14.36	14.16	14.20	14.08	-0.04	0.08	0.12
27-Jan	E	HRS	10.30	10.31	13.74	9.56	13.50	13.30	13.48	13.14	12.94	0.35	0.54	0.19
			11.00	10.36	14.44	10.20	14.35	14.20	14.18	14.07	13.92	0.11	0.26	0.15
04-Feb	E	HRS	11.60	10.43	14.18	10.03	14.19	14.19	13.93	14.00	13.99	-0.07	-0.06	0.01
04-Feb	E	HRS	11.60	10.30	13.93	9.96	14.45	14.18	13.67	14.12	13.86	-0.46	-0.19	0.26
04-Feb	E	HRS	11.90	10.92	14.29	10.43	14.36	14.16	14.12	14.11	13.91	0.01	0.20	0.20
04-Feb	E	HRS	11.60	10.37	14.34	10.29	14.02	14.14	14.08	13.75	13.87	0.33	0.21	-0.12
05-Feb	E	HRS	11.60	10.65	14.40	10.23	14.24	14.10	14.26	13.96	13.82	0.30	0.44	0.14
06-Feb	E	HRS	10.40	10.32	14.09	9.80	14.09	13.90	13.83	13.75	13.65	0.08	0.18	0.10

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
13-Feb	E	HRS	11.40	10.58	14.21	9.99	14.07	14.04	13.98	13.76	13.73	0.23	0.26	0.03
13-Feb	E	HRS	12.00	10.75	14.23	10.76	13.65	13.64	14.03	13.46	13.45	0.57	0.58	0.01
17-Feb	E	HRS	11.10	10.34	14.00	9.92	13.99	13.90	13.74	13.67	13.66	0.07	0.08	0.01
17-Feb	E	HRS	11.00	10.11	13.88	10.06	13.85	13.98	13.59	13.55	13.68	0.04	-0.09	-0.13
18-Feb	E	HRS	11.30	10.41	14.33	10.11	14.30	14.16	14.08	14.00	13.86	0.08	0.21	0.14
19-Feb	E	HRS	11.00	10.31	14.15	10.10	14.10	13.90	13.88	13.80	13.61	0.08	0.28	0.20
19-Feb	E	HRS	11.60	10.42	15.02	10.35	14.55	14.30	14.76	14.29	14.04	0.47	0.72	0.25
19-Feb	E	HRS	11.30	10.67	14.79	10.39	14.43	14.20	14.57	14.17	13.94	0.40	0.62	0.23
23-Feb	E	HRS	11.30	10.42	14.51	10.27	14.50	14.20	14.25	14.22	13.93	0.03	0.33	0.29
24-Feb	E	HRS	10.90	10.01	14.43	9.77	14.50	14.30	14.11	14.14	13.95	-0.03	0.16	0.20
24-Feb	E	HRS	11.80	10.61	15.06	10.36	15.00	14.80	14.83	14.73	14.53	0.10	0.30	0.20
			11.36	10.45	14.35	10.21	14.25	14.13	14.10	13.97	13.85	0.13	0.25	0.12
03-Mar	E	HRS	11.80	10.73	14.70	10.57	14.64	14.72	14.49	14.41	14.48	0.08	0.01	-0.08
04-Mar	E	HRS	11.40	10.63	14.61	10.31	14.63	14.30	14.39	14.35	14.03	0.03	0.36	0.32
11-Mar	E	HRS	10.00	9.34	15.93	9.33	15.85	15.32	15.46	15.19	14.87	0.27	0.59	0.32
11-Mar	E	HRS	11.20	10.35	15.67	9.96	15.58	15.72	15.38	15.23	15.36	0.15	0.02	-0.14
23-Mar	E	HRS	11.30	10.26	14.20	10.20	14.17	14.04	13.92	13.89	13.76	0.04	0.17	0.13
23-Mar	E	HRS	10.80	10.15	14.18	10.06	13.83	13.80	13.89	13.53	13.50	0.36	0.39	0.03
24-Mar	E	HRS	11.10	10.47	14.11	10.31	13.84	13.78	13.87	13.58	13.50	0.29	0.37	0.08
24-Mar	E	HRS	11.00	10.19	13.87	10.06	13.74	13.45	13.59	13.44	13.16	0.15	0.43	0.28

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	NH-E	NH-E	NP-E	NH-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
			11.08	10.26	14.66	10.10	14.51	14.30	14.37	14.20	14.08	0.17	0.29	0.12
			11.23	10.47	14.38	10.26	14.28	14.16	14.14	14.00	13.89	0.13	0.25	0.12
04-Dec	D	HRS	12.10	11.09	14.02	11.38	13.73	13.73	13.88	13.63	13.63	0.24	0.24	0.00
04-Dec	D	HRS	10.70	10.48	14.41	10.15	14.07	14.03	14.17	13.78	13.74	0.39	0.42	0.04
04-Dec	D	HRS	12.50	11.20	14.38	11.27	14.17	14.10	14.25	14.05	13.98	0.20	0.27	0.07
04-Dec	D	HRS	10.80	10.30	14.20	10.38	14.39	14.14	13.93	14.13	13.88	-0.20	0.05	0.25
05-Dec	D	HRS	11.00	10.80	14.64	10.14	14.22	13.92	14.44	13.93	13.63	0.52	0.81	0.29
05-Dec	D	HRS	11.30	11.00	14.19	10.42	14.29	14.32	14.03	14.04	14.07	-0.01	-0.04	-0.03
05-Dec	D	HRS	12.80	11.56	14.24	10.99	14.07	14.22	14.17	13.91	14.06	0.26	0.11	-0.15
05-Dec	D	HRS	10.60	9.96	14.30	9.97	13.86	13.96	13.98	13.55	13.65	0.43	0.33	-0.10
05-Dec	D	HRS	8.40	7.82	15.48	7.86	15.52	15.70	14.78	14.82	14.99	-0.04	-0.22	-0.17
05-Dec	D	HRS	12.40	10.84	14.13	10.85	13.96	14.12	13.95	13.78	13.94	0.17	0.01	-0.16
09-Dec	D	HRS	12.20	11.10	15.06	11.09	15.30	15.52	14.91	15.14	15.36	-0.24	-0.46	-0.22
10-Dec	D	HRS	10.60	9.77	14.50	9.94	14.36	14.06	14.14	14.03	13.74	0.11	0.40	0.29
11-Dec	D	HRS	8.00	7.71	15.98	7.83	16.30	16.28	15.24	15.56	15.54	-0.33	-0.31	0.02
11-Dec	D	HRS	10.70	9.91	14.44	10.08	14.80	14.42	14.11	14.48	14.11	-0.38	-0.01	0.37
11-Dec	D	HRS	11.20	9.98	14.68	10.27	14.42	14.16	14.35	14.14	13.89	0.21	0.46	0.25
13-Dec	D	HRS	12.30	11.22	13.43	11.05	13.16	13.56	13.31	13.02	13.42	0.29	-0.10	-0.40

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.		DIFFERENCES		
DATE	E/D	CL	MH-E	NH-E	NP-E	NH-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
13-Dec	D	HRS	8.00	7.85	15.94	7.79	15.93	15.96	15.22	15.20	15.23	0.02	-0.01	-0.03
13-Dec	D	HRS	11.70	10.67	14.10	10.51	13.76	13.72	13.89	13.53	13.49	0.36	0.40	0.04
15-Dec	D	HRS	9.70	9.32	14.75	9.11	14.38	14.20	14.31	13.92	13.75	0.39	0.57	0.17
15-Dec	D	HRS	11.10	10.74	15.47	10.26	15.40	15.04	15.25	15.10	14.75	0.15	0.50	0.35
17-Dec	D	HRS	11.10	10.21	14.75	10.27	14.84	15.00	14.46	14.55	14.71	-0.10	-0.25	-0.16
17-Dec	D	HRS	10.60	9.93	14.95	10.00	14.67	14.64	14.61	14.34	14.31	0.26	0.29	0.03
18-Dec	D	HRS	9.20	8.99	15.53	9.02	15.30	15.24	15.02	14.80	14.74	0.22	0.28	0.06
18-Dec	D	HRS	10.40	9.92	14.77	10.11	14.60	14.65	14.43	14.29	14.34	0.14	0.09	-0.05
18-Dec	D	HRS	10.20	9.68	14.96	9.55	14.76	14.74	14.58	14.36	14.34	0.22	0.23	0.02
18-Dec	D	HRS	10.80	9.90	14.53	10.13	14.24	14.05	14.19	13.94	13.76	0.25	0.43	0.19
18-Dec	D	HRS	10.60	9.99	14.53	10.18	14.37	14.17	14.21	14.08	13.88	0.13	0.32	0.20
18-Dec	D	HRS	10.20	9.75	14.79	9.81	14.63	14.40	14.42	14.27	14.05	0.15	0.37	0.22
19-Dec	D	HRS	12.20	10.68	14.19	10.99	14.00	14.02	13.98	13.84	13.86	0.14	0.12	-0.02
19-Dec	D	HRS	10.50	9.65	14.96	8.62	14.91	15.00	14.57	14.36	14.45	0.21	0.13	-0.09
19-Dec	D	HRS	10.10	9.20	15.29	9.41	15.06	15.44	14.82	14.63	15.00	0.19	-0.18	-0.37
19-Dec	D	HRS	9.20	8.73	15.39	8.84	15.52	15.49	14.84	14.98	14.95	-0.14	-0.11	0.03
19-Dec	D	HRS	11.10	9.68	13.60	9.76	13.58	13.56	13.25	13.24	13.22	0.01	0.03	0.02
22-Dec	D	HRS	11.60	10.37	13.65	10.25	13.27	13.52	13.40	13.01	13.26	0.39	0.15	-0.25
22-Dec	D	HRS	13.20	11.04	13.76	11.30	13.72	13.60	13.61	13.61	13.49	0.00	0.12	0.12
22-Dec	D	HRS	12.00	11.47	14.72	11.03	14.50	14.68	14.63	14.34	14.52	0.29	0.11	-0.18
22-Dec	D	HRS	12.00	11.95	14.35	11.59	14.23	14.40	14.34	14.16	14.41	0.18	-0.07	-0.25
22-Dec	D	HRS	7.70	8.17	15.16	8.19	14.91	14.92	14.53	14.29	14.30	0.24	0.23	-0.01

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.		DIFFERENCES		
DATE	E/D	CL	NH-E	NH-E	NP-E	NH-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
22-Dec	D	HRS	10.40	10.19	14.57	10.30	14.33	14.20	14.28	14.06	13.93	0.22	0.35	0.13
22-Dec	D	HRS	7.80	8.00	16.03	7.97	15.90	16.00	15.33	15.20	15.30	0.13	0.03	-0.10
22-Dec	D	HRS	12.70	12.08	14.37	11.46	14.48	14.64	14.38	14.39	14.55	-0.01	-0.17	-0.16
29-Dec	D	HRS	9.80	9.60	14.63	9.55	14.36	14.08	14.24	13.97	13.70	0.27	0.54	0.27
29-Dec	D	HRS	12.50	11.60	14.22	11.08	13.87	13.90	14.16	13.73	13.76	0.43	0.40	-0.03
28-Dec	D	HRS	11.60	11.08	14.54	11.09	14.27	14.12	14.39	14.12	13.98	0.27	0.42	0.15
29-Dec	D	HRS	11.20	10.38	14.15	10.26	14.33	14.29	13.89	14.05	14.00	-0.16	-0.11	0.05
29-Dec	D	HRS	12.70	11.52	15.39	11.51	14.93	14.96	15.31	14.85	14.88	0.46	0.43	-0.03
29-Dec	D	HRS	8.80	8.38	13.32	8.39	13.40	13.05	12.79	12.96	12.54	-0.16	0.26	0.42
30-Dec	D	HRS	12.60	10.94	15.07	11.26	14.86	14.93	14.89	14.74	14.81	0.15	0.09	-0.07
			10.86	10.13	14.64	10.07	14.50	14.48	14.33	14.19	14.16	0.14	0.17	0.02
02-Jan	D	HRS	9.20	8.90	14.47	8.68	14.34	14.00	13.99	13.82	13.49	0.17	0.50	0.33
02-Jan	D	HRS	10.50	10.00	14.83	9.97	14.51	14.52	14.50	14.18	14.19	0.32	0.31	-0.01
05-Jan	D	HRS	13.00	11.33	15.13	11.73	15.27	15.48	15.02	15.22	15.43	-0.21	-0.42	-0.21
05-Jan	D	HRS	11.00	10.73	15.50	10.62	15.69	15.60	15.28	15.45	15.36	-0.17	-0.08	0.09
06-Jan	D	HRS	9.60	9.18	14.22	8.94	14.27	13.84	13.78	13.79	13.37	-0.01	0.40	0.42
06-Jan	D	HRS	10.10	9.62	15.03	9.35	15.40	15.04	14.63	14.95	14.60	-0.32	0.03	0.35
06-Jan	D	HRS	12.80	12.02	13.80	11.57	14.03	14.04	13.80	13.96	13.97	-0.16	-0.17	-0.01
06-Jan	D	HRS	12.00	11.46	14.16	11.00	14.42	14.36	14.07	14.26	14.20	-0.18	-0.13	0.06
07-Jan	D	HRS	12.20	11.83	14.06	11.10	14.31	14.40	14.03	14.17	14.25	-0.13	-0.22	-0.08

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.			DIFFERENCES	
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
07-Jan	D	HRS	10.00	9.61	14.13	9.61	14.39	14.12	13.76	14.01	13.75	-0.25	0.01	0.26
07-Jan	D	HRS	11.40	11.12	14.05	10.69	14.12	14.08	13.91	13.91	13.87	0.00	0.04	0.04
08-Jan	D	HRS	11.30	10.48	13.38	10.43	13.62	13.41	13.15	13.38	13.17	-0.23	-0.02	0.21
08-Jan	D	HRS	11.00	10.08	14.29	10.03	14.34	14.12	13.98	14.03	13.81	-0.04	0.17	0.22
08-Jan	D	HRS	10.20	9.66	14.08	9.30	14.14	14.20	13.72	13.72	13.78	0.00	-0.06	-0.06
08-Jan	D	HRS	11.20	10.45	13.88	10.47	13.80	13.72	13.64	13.56	13.49	0.08	0.15	0.08
08-Jan	D	HRS	11.20	10.25	15.74	10.55	15.46	15.60	15.43	15.21	15.35	0.22	0.09	-0.14
12-Jan	D	HRS	11.50	10.78	14.26	10.47	14.20	14.08	14.07	13.96	13.84	0.11	0.23	0.12
12-Jan	D	HRS	9.30	8.96	14.37	9.09	13.99	13.64	13.89	13.54	13.20	0.35	0.69	0.34
12-Jan	D	HRS	11.00	10.44	14.25	10.40	14.34	14.20	14.00	14.08	13.95	-0.08	0.06	0.14
12-Jan	D	HRS	9.00	8.72	15.30	9.06	14.99	14.92	14.75	14.51	14.44	0.24	0.31	0.07
12-Jan	D	HRS	11.90	10.97	14.56	10.83	14.31	14.32	14.39	14.12	14.13	0.27	0.26	-0.01
12-Jan	D	HRS	11.20	10.59	14.70	10.55	14.54	14.44	14.47	14.30	14.21	0.16	0.26	0.10
13-Jan	D	HRS	10.60	9.99	14.14	9.98	14.19	13.92	13.82	13.87	13.61	-0.05	0.22	0.26
13-Jan	D	HRS	10.90	10.41	14.01	10.23	13.94	14.04	13.76	13.67	13.76	0.10	0.00	-0.10
13-Jan	D	HRS	10.60	9.82	14.47	9.83	14.01	13.92	14.12	13.67	13.59	0.45	0.54	0.08
13-Jan	D	HRS	10.80	10.28	13.63	9.86	13.76	13.52	13.37	13.43	13.20	-0.06	0.17	0.23
14-Jan	D	HRS	10.70	10.04	14.13	9.95	14.15	14.00	13.82	13.83	13.68	-0.01	0.14	0.15
14-Jan	D	HRS	7.90	7.94	15.61	7.96	15.42	15.25	14.92	14.74	14.58	0.18	0.34	0.16
14-Jan	D	HRS	10.40	10.12	15.04	9.78	15.08	14.88	14.73	14.71	14.51	0.02	0.21	0.20
14-Jan	D	HRS	10.70	10.04	14.44	9.83	14.33	14.52	14.13	13.99	14.17	0.14	-0.05	-0.19
21-Jan	D	HRS	10.30	9.88	15.32	9.84	15.41	15.52	14.96	15.04	15.15	-0.08	-0.19	-0.11

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
22-Jan	D	HRS	10.40	10.04	15.37	9.81	15.02	15.04	15.04	14.66	14.67	0.38	0.36	-0.02
22-Jan	D	HRS	9.80	9.32	15.28	9.35	15.41	15.52	14.83	14.96	15.07	-0.13	-0.24	-0.11
27-Jan	D	HRS	10.90	10.24	14.43	10.22	14.46	14.30	14.15	14.17	14.02	-0.03	0.13	0.16
27-Jan	D	HRS	11.20	10.38	14.02	10.00	14.08	13.98	13.77	13.77	13.67	0.00	0.10	0.10
27-Jan	D	HRS	12.90	11.53	14.32	11.53	14.60	14.86	14.24	14.52	14.78	-0.28	-0.54	-0.26
27-Jan	D	HRS	13.20	11.52	13.78	11.13	14.18	14.22	13.71	14.04	14.08	-0.34	-0.38	-0.04
27-Jan	D	HRS	11.20	10.31	13.86	9.97	13.53	13.39	13.60	13.22	13.09	0.37	0.51	0.14
28-Jan	D	HRS	10.60	9.44	14.28	9.17	14.07	13.86	13.88	13.63	13.43	0.24	0.45	0.20
28-Jan	D	HRS	12.20	11.49	13.74	10.89	13.72	13.98	13.66	13.55	13.81	0.11	-0.15	-0.26
28-Jan	D	HRS	10.90	10.28	14.45	10.06	14.39	14.48	14.17	14.08	14.17	0.09	0.01	-0.09
29-Jan	D	HRS	12.30	10.72	13.89	10.80	13.64	13.41	13.69	13.46	13.23	0.23	0.46	0.23
30-Jan	D	HRS	9.80	9.66	13.21	9.26	13.16	13.27	12.87	12.76	12.87	0.11	0.00	-0.11
30-Jan	D	HRS	11.60	10.85	14.21	10.29	14.00	14.16	14.03	13.73	13.89	0.29	0.14	-0.16
30-Jan	D	HRS	9.30	9.25	15.53	9.16	15.25	15.13	15.06	14.77	14.66	0.29	0.40	0.12
			10.88	10.24	14.43	10.07	14.41	14.34	14.15	14.10	14.03	0.05	0.11	0.06
02-Feb	D	HRS	9.50	8.91	14.88	8.71	15.76	14.86	14.38	14.52	14.32	-0.14	0.05	0.19
02-Feb	D	HRS	9.60	9.27	14.84	8.95	14.86	14.84	14.39	14.36	14.34	0.03	0.05	0.02
02-Feb	D	HRS	9.90	9.55	14.75	9.20	14.85	14.87	14.35	14.39	14.41	-0.04	-0.06	-0.02
02-Feb	D	HRS	9.20	9.00	14.93	8.61	14.89	14.85	14.44	14.34	14.30	0.10	0.14	0.04
04-Feb	D	HRS	11.10	10.28	14.50	10.06	14.51	14.30	14.22	14.20	13.99	0.03	0.23	0.21

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.			DIFFERENCES		
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
04-Feb	D	HRS	11.30	10.28	14.43	10.13	14.48	14.46	14.15	14.18	14.16	-0.03	-0.01	0.02
04-Feb	D	HRS	11.90	10.07	14.29	10.64	14.09	14.12	13.98	13.88	13.91	0.11	0.08	-0.03
04-Feb	D	HRS	11.60	10.43	14.77	10.38	14.88	14.78	14.51	14.61	14.51	-0.10	0.00	0.10
17-Feb	D	HRS	12.30	11.11	15.12	10.83	14.94	15.10	14.97	14.74	14.90	0.22	0.07	-0.16
17-Feb	D	HRS	12.60	11.23	15.06	11.18	15.11	15.38	14.93	14.97	15.24	-0.04	-0.31	-0.27
17-Feb	D	HRS	11.90	11.12	15.01	10.49	15.21	15.38	14.86	14.95	15.12	-0.09	-0.26	-0.17
17-Feb	D	HRS	12.10	11.22	15.07	10.49	15.14	15.18	14.94	14.88	14.92	0.05	0.01	-0.04
18-Feb	D	HRS	11.60	10.81	13.88	10.65	13.86	13.82	13.69	13.65	13.61	0.04	0.08	0.04
18-Feb	D	HRS	11.50	10.78	14.13	10.58	13.92	14.02	13.94	13.70	13.80	0.24	0.14	-0.10
20-Feb	D	HRS	10.60	10.02	14.39	9.94	14.16	13.96	14.07	13.84	13.64	0.24	0.43	0.20
20-Feb	D	HRS	10.40	9.73	14.29	9.76	14.12	14.00	13.93	13.77	13.65	0.16	0.28	0.12
20-Feb	D	HRS	10.10	9.59	14.07	9.40	13.82	13.74	13.69	13.42	13.35	0.27	0.35	0.08
20-Feb	D	HRS	10.50	9.93	14.23	9.96	13.80	13.72	13.90	13.49	13.41	0.42	0.49	0.08
23-Feb	D	HRS	10.80	9.99	14.43	9.83	14.55	14.44	14.11	14.20	14.09	-0.09	0.02	0.11
23-Feb	D	HRS	8.80	9.35	14.45	9.14	14.11	14.00	14.03	13.67	13.56	0.36	0.47	0.11
23-Feb	D	HRS	10.50	9.94	14.30	9.53	14.11	14.00	13.97	13.72	13.62	0.25	0.36	0.11
24-Feb	D	HRS	11.10	10.27	14.27	10.02	14.04	13.82	13.99	13.73	13.52	0.26	0.48	0.22
24-Feb	D	HRS	11.30	10.11	14.39	10.01	14.27	14.04	14.09	13.95	13.73	0.13	0.36	0.22
24-Feb	D	HRS	10.90	10.20	14.52	9.95	14.16	14.13	14.23	13.84	13.81	0.39	0.42	0.03
24-Feb	D	HRS	11.40	10.51	14.13	10.01	14.12	13.82	13.89	13.81	13.51	0.09	0.38	0.29
24-Feb	D	HRS	11.90	11.16	15.38	10.68	15.36	15.38	15.23	15.13	15.15	0.10	0.08	-0.02
25-Feb	D	HRS	11.30	11.14	13.94	9.91	13.82	13.54	13.81	13.50	13.23	0.31	0.58	0.27

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	HM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
25-Feb	D	HRS	12.10	10.65	14.42	10.51	14.14	14.04	14.20	13.90	13.81	0.30	0.40	0.10
25-Feb	D	HRS	11.60	10.42	14.25	10.29	14.38	14.22	14.00	14.11	13.95	-0.11	0.05	0.16
25-Feb	D	HRS	12.40	10.87	13.91	10.47	13.84	13.82	13.73	13.60	13.58	0.13	0.15	0.02
26-Feb	D	HRS	10.90	10.36	14.63	9.68	14.72	14.68	14.36	14.34	14.30	0.02	0.06	0.04
26-Feb	D	HRS	9.70	9.42	14.09	8.96	14.27	13.96	13.69	13.79	13.49	-0.10	0.19	0.30
26-Feb	D	HRS	10.80	10.27	14.48	9.62	14.94	14.92	14.20	14.55	14.53	-0.35	-0.33	0.02
27-Feb	D	HRS	9.30	9.26	14.55	9.08	14.58	14.68	14.11	14.11	14.21	0.00	-0.10	-0.10
27-Feb	D	HRS	9.70	9.12	14.63	9.22	14.47	14.52	14.17	14.03	14.08	0.14	0.09	-0.05
			10.92	10.18	14.50	9.91	14.45	14.38	14.20	14.11	14.05	0.09	0.15	0.06
02-Mar	D	HRS	9.20	9.05	15.56	8.86	15.10	15.72	15.06	14.58	15.18	0.48	-0.12	-0.60
02-Mar	D	HRS	12.10	11.46	12.11	10.72	12.20	12.06	12.04	12.03	11.89	0.01	0.15	0.14
02-Mar	D	HRS	9.30	9.18	14.22	8.80	14.45	14.48	13.78	13.94	13.97	-0.16	-0.19	-0.03
03-Mar	D	HRS	11.00	10.42	14.50	10.09	14.44	14.36	14.24	14.13	14.05	0.11	0.19	0.08
04-Mar	D	HRS	8.60	8.63	15.35	8.55	15.43	15.16	14.78	14.85	14.59	-0.06	0.20	0.26
04-Mar	D	HRS	10.10	10.02	13.71	9.72	13.72	13.45	13.41	13.37	13.11	0.03	0.30	0.26
05-Mar	D	HRS	9.00	8.73	14.71	8.61	14.51	14.56	14.18	13.97	14.02	0.21	0.16	-0.05
05-Mar	D	HRS	11.80	11.16	13.75	11.56	13.33	13.60	13.62	13.26	13.53	0.36	0.09	-0.27
05-Mar	D	HRS	9.40	9.44	14.46	9.14	14.52	14.44	14.05	14.06	13.99	-0.01	0.07	0.08
09-Mar	D	HRS	9.90	9.89	14.65	9.58	14.52	14.26	14.31	14.13	13.88	0.18	0.43	0.25
09-Mar	D	HRS	10.60	10.48	15.24	9.91	15.13	14.92	14.98	14.78	14.57	0.20	0.41	0.21

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

													DIFFERENCES	
										12% m.b.				
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
09-Mar	D	HRS	11.00	10.73	13.96	10.20	13.74	13.72	13.76	13.46	13.44	0.30	0.32	0.02
11-Mar	D	HRS	10.00	9.42	14.16	9.29	13.93	13.68	13.76	13.51	13.27	0.24	0.49	0.24
11-Mar	D	HRS	10.30	9.82	14.45	9.79	14.08	14.08	14.10	13.74	13.74	0.37	0.37	0.00
11-Mar	D	HRS	10.30	9.68	14.72	9.87	14.36	14.20	14.34	14.02	13.86	0.32	0.48	0.16
11-Mar	D	HRS	9.40	9.12	14.42	9.07	14.29	14.12	13.96	13.83	13.67	0.13	0.30	0.16
11-Mar	D	HRS	10.30	9.80	14.52	9.97	14.17	14.02	14.17	13.85	13.70	0.32	0.46	0.15
11-Mar	D	HRS	10.30	9.98	14.18	10.31	13.58	13.60	13.86	13.32	13.34	0.54	0.52	-0.02
13-Mar	D	HRS	9.60	9.38	14.46	8.42	13.94	13.96	14.04	13.40	13.41	0.65	0.63	-0.02
13-Mar	D	HRS	9.60	9.38	13.09	9.06	12.94	12.97	12.71	12.52	12.55	0.19	0.16	-0.03
13-Mar	D	HRS	10.30	10.26	14.26	9.54	14.04	14.12	13.98	13.66	13.74	0.33	0.25	-0.08
16-Mar	D	HRS	10.80	10.65	14.14	9.88	14.40	14.48	13.93	14.06	14.14	-0.13	-0.21	-0.08
16-Mar	D	HRS	10.20	10.05	15.71	9.71	15.68	16.20	15.37	15.28	15.79	0.09	-0.42	-0.51
18-Mar	D	HRS	11.30	10.62	14.34	9.98	14.18	14.00	14.12	13.86	13.69	0.26	0.43	0.18
18-Mar	D	HRS	9.30	9.30	14.36	8.85	14.36	14.26	13.93	13.86	13.77	0.07	0.17	0.10
19-Mar	D	HRS	12.20	11.16	13.61	11.10	13.21	13.60	13.48	13.08	13.46	0.41	0.02	-0.38
19-Mar	D	HRS	10.20	9.66	13.72	9.48	13.52	13.40	13.36	13.14	13.11	0.22	0.25	0.03
19-Mar	D	HRS	11.80	11.13	14.04	11.05	14.04	14.24	13.90	13.89	14.09	0.01	-0.19	-0.20
20-Mar	D	HRS	11.40	10.51	14.64	10.33	14.63	14.28	14.40	14.36	14.01	0.04	0.38	0.34
20-Mar	D	HRS	9.00	8.79	13.35	8.02	12.92	12.62	12.88	12.47	12.18	0.41	0.70	0.29
20-Mar	D	HRS	10.10	9.97	13.33	9.99	13.14	12.85	13.03	12.85	12.56	0.18	0.47	0.28
20-Mar	D	HRS	9.20	8.95	14.80	8.91	14.50	14.40	14.30	14.01	13.91	0.30	0.39	0.10
20-Mar	D	HRS	10.40	10.12	14.78	10.20	14.81	14.94	14.47	14.51	14.64	-0.04	-0.17	-0.13

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

										12% m.b.			DIFFERENCES	
DATE	E/D	CL	NM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
23-Mar	D	HRS	11.40	11.04	13.75	10.80	13.39	13.49	13.60	13.21	13.31	0.39	0.29	-0.10
23-Mar	D	HRS	8.50	8.07	14.95	8.56	15.16	14.92	14.31	14.59	14.36	-0.28	-0.05	0.23
23-Mar	D	HRS	9.80	9.13	15.79	9.14	15.34	15.49	15.29	14.86	14.99	0.43	0.30	-0.14
23-Mar	D	HRS	9.40	8.93	14.17	8.79	14.03	13.78	13.69	13.54	13.28	0.16	0.42	0.26
23-Mar	D	HRS	12.10	11.24	13.60	10.82	13.64	13.56	13.48	13.46	13.38	0.02	0.10	0.08
24-Mar	D	HRS	10.80	9.99	14.74	9.98	14.74	14.44	14.41	14.41	14.12	0.00	0.29	0.29
24-Mar	D	HRS	9.20	9.20	14.70	8.82	14.63	14.12	14.25	14.12	13.63	0.13	0.62	0.49
24-Mar	D	HRS	9.50	9.27	15.14	9.05	14.84	14.64	14.69	14.36	14.17	0.33	0.52	0.19
24-Mar	D	HRS	10.60	10.10	14.29	9.75	14.38	14.00	13.99	14.02	13.65	-0.03	0.34	0.37
24-Mar	D	HRS	8.40	8.43	15.28	8.18	14.98	14.86	14.69	14.36	14.24	0.33	0.44	0.12
25-Mar	D	HRS	8.40	8.25	12.35	8.25	11.97	11.50	11.85	11.49	11.03	0.36	0.82	0.46
25-Mar	D	HRS	8.90	8.78	14.19	8.64	14.11	13.84	13.69	13.59	13.33	0.10	0.36	0.26
26-Mar	D	HRS	10.20	9.59	14.70	9.33	14.42	14.10	14.31	14.00	13.69	0.31	0.62	0.31
26-Mar	D	HRS	10.00	9.43	15.19	9.27	15.28	14.68	14.76	14.82	14.24	-0.06	0.52	0.58
27-Mar	D	HRS	9.20	9.11	15.33	8.58	15.42	15.48	14.84	14.84	14.90	0.00	-0.06	-0.06
30-Mar	D	HRS	12.30	10.74	14.08	10.93	13.80	13.96	13.88	13.63	13.79	0.25	0.09	-0.16
30-Mar	D	HRS	10.20	9.72	14.06	9.91	13.88	13.64	13.70	13.56	13.32	0.15	0.38	0.23
30-Mar	D	HRS	10.20	9.84	13.98	9.69	13.75	13.64	13.65	13.40	13.29	0.25	0.35	0.11
30-Mar	D	HRS	12.10	10.74	13.96	10.84	13.40	13.72	13.76	13.30	13.54	0.46	0.22	-0.24
30-Mar	D	HRS	10.10	9.45	13.91	9.68	13.63	13.60	13.52	13.28	13.25	0.24	0.27	0.03
30-Mar	D	HRS	10.30	9.43	14.09	9.30	14.03	13.88	13.69	13.62	13.48	0.07	0.21	0.15

TABLE IX - FIELD OFFICE PROTEIN COMPARISON (EXPORT AND DOMESTIC)

									12% m.b.			DIFFERENCES	
DATE	E/D	CL	MM-E	NM-E	NP-E	NM-F	NP-F	KP-F	NP-E	NP-F	KP-F	NPE-NPF	NPE-KPF	NPF-KPF
--------	---	----	------	------	------	------	------	------	------	------	------	------	------	------
			10.18	9.77	14.33	9.56	14.16	14.08	13.97	13.78	13.70	0.19	0.27	0.08
01-Apr	D	HRS	10.50	9.71	13.84	9.61	13.90	13.49	13.49	13.53	13.13	-0.04	0.36	0.40
01-Apr	D	HRS	11.60	10.02	13.84	10.23	13.87	13.37	13.54	13.60	13.11	-0.06	0.43	0.49
01-Apr	D	HRS	10.90	9.73	13.80	9.70	13.55	13.60	13.45	13.20	13.25	0.25	0.20	-0.05
			11.00	9.82	13.83	9.85	13.77	13.49	13.49	13.44	13.16	0.05	0.33	0.28
			10.68	10.06	14.45	9.90	14.35	14.29	14.14	14.02	13.96	0.12	0.18	0.06
			10.81	10.19	14.44	9.98	14.34	14.26	14.15	14.02	13.94	0.13	0.21	0.08

KEY:

E/D = Export/Domestic shipment
MM-E - Motomco moisture percent export elevator
NM-E = NIR moisture percent export elevator
NP-E or NPE = NIR protein export elevator
NM-F = NIR moisture percent field office
NP-F or NPF = NIR protein field office
KP-F or KPF = Kjeldahl protein field office

12% m.b. = 12 percent moisture basis

TABLE X

Comparison of Export and Domestic Samples at Portland Field Office

PROTEIN Difference	Export Sample No.	Export Sample %	Export Mean %	Domestic Sample No.	Domestic Sample %	Domestic Mean %
0.89 - 0.80				2	1.08	0.815
0.79 - 0.70	2	3.51	0.755	1	0.54	0.700
0.69 - 0.60	1	1.75	0.620	4	2.16	0.640
0.59 - 0.50	5	8.77	0.562	10	5.41	0.530
0.49 - 0.40	5	8.77	0.438	29	15.68	0.438
0.39 - 0.30	14	24.56	0.343	24	12.97	0.345
0.29 - 0.20	8	14.04	0.244	22	11.89	0.257
± 0.19	20	35.09	0.046	79	42.70	0.033
-0.20 - (-0.29)	2	3.51	-0.255	6	3.24	-0.233
-0.30 - (-0.39)				4	2.16	-0.333
-0.40 - (-0.49)				3	1.62	-0.430
-0.50 - (-0.59)				1	0.54	-0.540

```
---------------------- ANALYSIS OF VARIANCE ----------------------



                              ONE-WAY ANOVA

TABLE XI - ANALYSIS OF VARIANCE BETWEEN NIR VS KJELDAHL PROTEIN

                    GROUP          MEAN     N
                       1         14.143   361
                       2         13.901   361

               GRAND MEAN        14.022   722

  SOURCE     SUM OF SQUARES   D.F.   MEAN SQUARE    F RATIO     PROB.
 BETWEEN           10.524       1         10.524     58.112     3.000E-14
 WITHIN           130.394     720           .181
 TOTAL            140.918     721
```

KEY:

1 = QCL-NIR protein

2 = QCL-Kjeldahl protein

```
---------REGRESSION ANALYSIS-------------------


                            ------------------
                  S.E. ASIA PROTEIN AACC VS LAB

INDEX         NAME        MEAN         STD.DEV.
  1           NO.         14.464         8.235
  2           MEAN        12.723         5.419
DEP. VAR.:    LAB         12.658         5.278
-----------------------------------------------

DEPENDENT VARIABLE:  LAB

VAR.  REGRESSION COEFFICIENT
MEAN                    .973
CONSTANT                .274

STD. ERROR OF EST. = .203

          r SQUARED = .999
                  r = .999

STD. ERROR    T(DF=  26)     PROB.
7.2198E-03     134.811      .00000

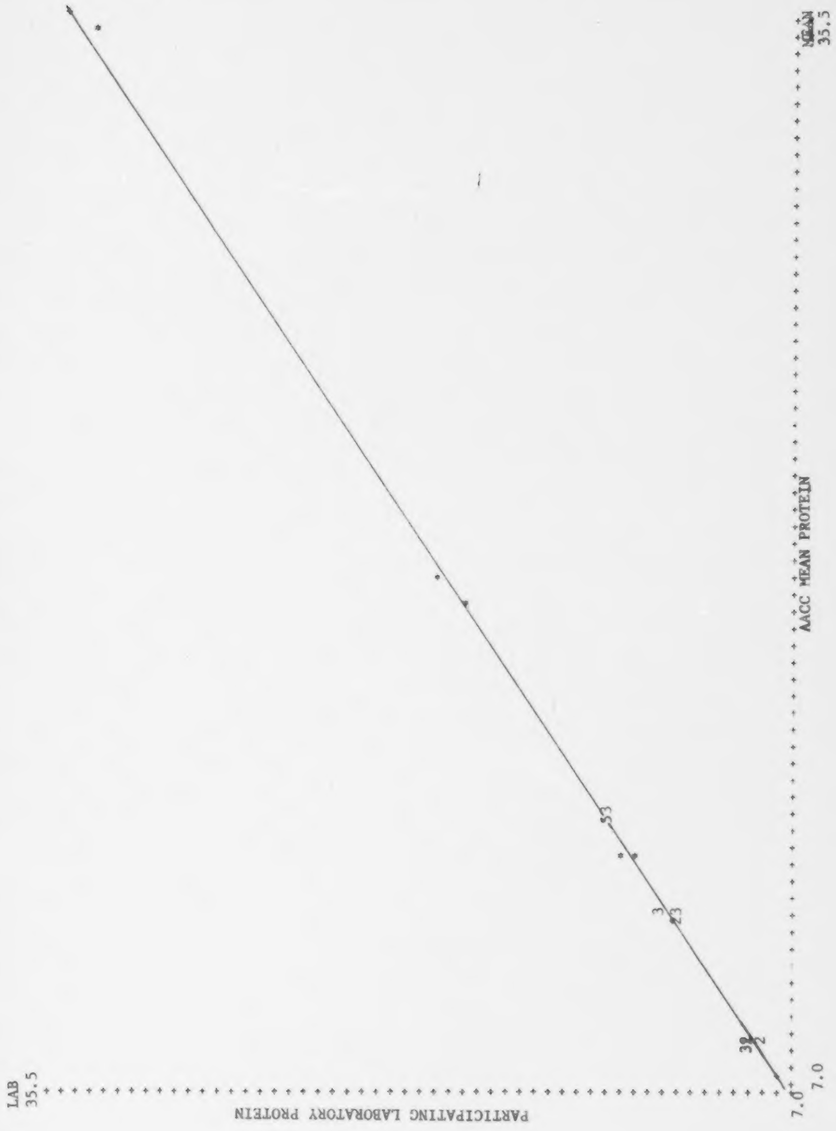

              ANALYSIS OF VARIANCE TABLE

SOURCE          SUM OF SQUARES    D.F.
REGRESSION             751.152       1
RESIDUAL                 1.075      26
TOTAL                  752.227      27


MEAN SQUARE       F. RATIO     PROB.
    751.152      18173.960   .000E+00
       .041
```

```
         OBSERVED  CALCULATED   RESIDUAL

    1       8,018      8,187        -.169
    2       7.873      7.976        -.103
    3       7.718      7.761        -.043
    4       8.021      7.991         .030
    5      11.166     11.171    -5.093-03
    6      13.956     13.720         .236
    7      11.326     11.231         .095
    8      13.828     13.587         .241
    9       7.998      8.187        -.189
   10       7.543      7.761        -.218
   11       7.909      7.991        -.082
   12      11.203     11.171         .032
   13      11.151     11.231        -.080
   14      13.828     13.587         .241
   15      11.062     11.090        -.028
   16      13.786     13.863        -.077
   17      11.222     11.218   4.1884E-03
   18      13.655     13.646   8.7887E-03
   19      12.796     12.734         .062
   20      13.313     12.719         .594
   21      13.700     13.943        -.243
   22      19.514     19.424         .090
   23      20.344     20.069         .275
   24      34.027     34.340        -.313
   25      10.976     11.090        -.114
   26      13.573     13.863        -.290
   27      11.080     11.218        -.138
   28      13.830     13.646         .184
```


LAB
35.5
PARTICIPATING LABORATORY PROTEIN
7.0
7.0
AACC MEAN PROTEIN
MEAN
35.5
53
3
23
32
2

Senator **Melcher**. I have a series of questions here for Mr. Baker, and I am going to just go through them very quickly, Mr. Baker.

You did tell Al Williams that an error had been made, in Dr. Watson's absence, pertaining to the lowering of the Hard Red Spring wheat protein baseline from 13.89 to 13.69 on May 4, did you not?

Mr. **Baker**. Yes. But as I understood it, Dr. Watson's absence was during the initial lowering, April 15. That was when his absence was. I talked to Mr. Williams about this. But the reason why this ties in is because those samples—the new reference samples were already in existence at that time. They were already in existence, and the baseline for those samples had already been established at 13.89, and it was assumed that the 0.2 lowering of the original reference samples also applied to the new reference samples.

Senator **Melcher**. Now, did you tell Al Williams that the 0.2 percent error would be corrected?

Mr. **Baker**. No. I did not say anything about an error, but the——

Senator **Melcher**. All right. The 0.2 percent adjustment.

Mr. **Baker**. Difference, difference between the 13.89 and the 13.69.

Senator **Melcher**. That would be corrected by raising the Hard Red Spring wheat protein baseline by 0.1 on June 15, and a correction of the other half——

Mr. **Baker**. That was Larry Zehm that told him on June 15.

Senator **Melcher**. Larry Zehm.

Did you tell him that?

Mr. **Zehm**. Yes, sir, I did.

Senator **Melcher**. That it would be corrected on June 15, and then that there would be another 0.1 that would take place in August?

Mr. **Zehm**. I didn't say there would be another change. I was not aware of that.

Senator **Melcher**. Did you, Mr. Baker?

Mr. **Baker**. I think that particular thing, Mr. Williams may have read something into it. I think I was told by Dr. Watson that there would be a new set of reference samples—and I understood a complete new set of reference samples would be out in August. And he said that—when we had the new set of reference samples in effect, that would correct some of the problems, or something like that; and if Mr. Williams was of the opinion that there was another tenth error in there, then that could be construed to mean that is what would happen.

But I was never convinced, my own self, that there was a 0.2 difference between the original reference samples—I should say, that there was a 0.2 error—when we lowered from 13.89 to 13.69. I was never convinced of that because I didn't see that on my own instrument. When I lowered my own instrument, I did not see that big an error, that big a change. So as far as I was concerned on June 15, when we raised our baseline to 13.79, we had corrected all the error. As far as I could tell on my own instrument, we had corrected all the error.

But Mr. Williams did some studies on his own that seemed—I guess that seemed to indicate that is not true, that there was still some error in the system. But on my own instrument, I was convinced that we had corrected all the error.

Senator **Melcher**. Well, Mr. Zehm, when you told the Montana Agency to raise the baseline value from 13.69 to 13.79, were you told to do that?

Mr. **Zehm**. Yes, sir. That came from the Quality Control Testing Branch in Kansas City. Mr. Ron Bicsak called us on that date.

Senator **Melcher**. And he told you to do that. All right. Then did you also tell Mr. Williams at that time that increase was not to be announced?

Mr. **Zehm**. They just advised me that there would be no confirmation in writing for this raise.

Senator **Melcher**. That is Kansas City again?

Mr. **Zehm**. Yes, sir.

Senator **Melcher**. When they asked, from Montana, to have written verification of that June 15 increase, why wasn't it given?

Mr. **Zehm**. Because of the original phone call on the 15th when they said there would not be written——

Senator **Melcher**. Has this ever happened to you before? Has somebody said, "Well, if they ask for a written verification, turn them down"?

Mr. **Zehm**. Well, we called to reverify that at the testing branch, and they——

Senator **Melcher**. But had it ever happened to you before? Isn't that routinely given?

Mr. **Zehm**. Well, normally, for most things, written verification is given, but not on all circumstances.

Senator **Melcher**. Isn't it routinely given when it's asked for?

Mr. **Zehm**. Not if they will not give it to us.

Senator **Melcher**. Well, I'm asking you. Had it ever occurred before, when a State asked you for written verification of a direction? Had you ever turned them down because you were instructed to turn them down?

Mr. **Zehm**. I can't issue that unless I am authorized to do that.

Senator **Melcher**. The answer is—that isn't answering the question. Had it ever——

Mr. **Zehm**. Not to my knowledge, it hasn't.

Senator **Melcher**. In your experience—and how long is your experience?

Mr. **Zehm**. I have worked for FGIS for 25 years.

Senator **Melcher**. You have got a quarter of a century in then.

Mr. **Zehm**. Another one of those.

Senator **Melcher**. Another one of those—we ought to give you pens, some sort of awards. But in 25 years, anytime anybody asked for a written verification of an order, you just routinely wrote it out to them, did you not?

Mr. **Zehm**. I would say, normally, I probably would have, if it wasn't violating any instruction or any verbal message——

Senator **Melcher**. Well, that's the point. That is precisely the point. Have you ever been told not to give written verification before?

Mr. **Zehm**. I don't recall. It's possible.

Senator **Melcher**. Well, now, Mr. Miller, those questions and those answers were for your edification. Are you satisfied with this?

Mr. **Miller**. No, sir.

Senator **Melcher**. What in the world goes on? Where does this originate?

Mr. **Miller**. Well, it originates when we had problems occur in the system with which we had to resolve. I wish, when I walked in the door, I wouldn't have had to deal with the mounting foreign complaints regarding protein discrepancies.

Senator **Melcher**. We've heard that. We all fully understand that. We're are just of one mind on that.

Where did this occur, this change in policy—probably contrary to law, by the way, is it not? Well, I'm not going to ask you that. You will have to ask your counsel, and that takes too long.

This was a written request for verification from Montana, was it not?

Mr. **Zehm**. Yes, sir. It was also asked on the phone.

Senator **Melcher**. Oral and written.

Mr. **Zehm**. Yes, sir.

Senator **Melcher**. Now, Mr. Miller, where was the decision made that, contrary to all policy and conceivably—and probably contrary to law, written verification wouldn't be given?

Mr. **Miller**. I think that that decision was made on June 3 in my office.

Senator **Melcher**. You are saying that on June 3, you deliberately set in motion a new policy that said, "If they ask for written verification of this order, we are going to keep it secret"?

Mr. **Miller**. I did not set it in motion, but I probably condoned it by not putting a stop to it at that point.

Senator **Melcher**. Well, who was responsible—if you condoned it, who is responsible for wanting it?

Mr. **Miller**. There were several people present in the meeting; I don't remember exactly who brought up the idea or the subject, but I condoned it by not specifically saying at that time, "Absolutely not," even for a bias change. Again, such adjustments have been made in the past without written confirmation. In hindsight, it should have been provided in writing, even though it was only a bias change.

Senator **Melcher**. Well, last week you and I talked about whether the Inspector General should be looking at this.

Mr. **Miller**. Yes, sir.

Senator **Melcher**. You were going to meet with the Inspector General, I think, on Friday. We met on Thursday; you were going to meet with him on Friday.

Mr. **Miller**. Yes, sir.

Senator **Melcher**. And the Inspector General, I understand, is looking at it.

Mr. **Miller**. I understand they are present here today.

Senator **Melcher**. I want to tell you that on this point, not only the Inspector General is going to look at it very carefully, because it may well be a violation of law, as it appears on its surface, but I am going to be sure that the Secretary of Agriculture has his Solicitor's advice on just how this is going to be handled.

The disturbing part about this comes in two ways: There was no recalibration of those near infrared—somebody called them machines, I am going to call them an instrument, but whatever it is called, there is no recalibration of that, even though a request had been made, and properly made. Second, in all the changes that were made, there occurred, from June 15 on, a deliberate attempt not to make them public, which I don't believe—I believe it is not only improper, I believe it violates the law.

Out of all of this, we have had some question of whether or not individual producers were damaged, but there is also a broader question of where would be the confidence in the integrity of the system, that was referred to earlier by grain inspectors, the grain inspector from Montana and the Director of Grain Inspection in the State of Washington, the fact that they felt very alarmed and one felt very shaky—is his word—and the second felt very angry.

That sort of condoning—and that is your word, Mr. Miller, whether it is intentional, unintentional, or well thought out or just done because of influence or a determination by you that you were going to go along with somebody, that doesn't—that just can't wash. There is a lot at stake here, including the sale of our grain from this year's crop and next year's crop and the crops thereon, and we have to view it very seriously.

I have no further questions.

Mr. MILLER. May I respond, Senator Melcher?

Senator MELCHER. Please do.

Mr. MILLER. Again, I think that I would agree with your evaluation; that certainly, in retrospect, we should have provided written verification. First of all, I didn't know about the specific Montana request for written verification at that time. I may not have changed anything, at that point, but I didn't know about it.

At the same time, I think it is important to point out again that a review of the facts of the matter show that there was not a 0.4 percent change. Because of the fact that we put new procedures into effect at that time that caused the system readings to be lower than our reference values, I agreed with the management recommendations that came forth from the Standardization Division to bias the NIR instruments up on the high side of the baseline. I also agreed with their recommendation that that not be done in writing. I accept responsibility for agreeing to those recommendations from management.

Senator MELCHER. Mr. Miller, I don't want you to miss the point—and you may well miss it—and that is, what we are asking is accuracy, and what might serve some purposes in moving out grain might be served by having the bias on the high side. I'm well aware of the complaints made by countries that had been buying some spring wheat from us, that they thought the protein content was off. But there might be people within your Department and within the administration that would just as soon see a bias on the high side, just to make it easier to move the grain.

We have all kinds of ways that are direct and understood and publicly accepted and are the law to move grain by lowering the price. What we insist on here is accuracy. And so there may very well be, within your Agency, people who would recommend that the bias be on the high side, simply to make it easier to move the grain.

I don't know whether that point escaped you or not, but since you hadn't mentioned it, I am making it—I am drawing it to your attention, to make sure that you understand that.

Mr. **Miller**. I am not aware of anyone trying to use such tactics to market grain. I think that any of the actions that have been taken by anyone in this Agency, as near as I can tell, have all been directed toward trying to maintain the highest integrity program that we possibly could, given the vagaries of the instrumentation and the——

Senator **Melcher**. Somebody said to keep this secret.

Mr. **Miller**. It was never said in my presence, sir.

Senator **Melcher**. Would somebody have led you to believe that you would have condoned a policy of secrecy?

Mr. **Miller**. I disagree with that premise. I don't think there are any secrets in the grain trade for very long. As soon as one of the technicians adjust one of these instruments, for whatever reason, it becomes common knowledge for all the people that are in that service area. I don't think that I am naive enough, or anyone else on my staff is naive enough to think that there are any secrets in this business. I am told that adjustments to these instruments become common knowledge to the trade very quickly.

I certainly don't condone any type of a secret coverup. I have never been a party to that, and I don't condone that. I was led to believe that the action was a bias adjustment that absolutely did not require a written notification. I went along with the recommendation, and I stand by that. I think, in retrospect, I probably should have overridden that recommendation and action.

Senator **Melcher**. Well, I would think so on June 24, in the meeting in Portland, that that would have been your decision, but it was not.

Mr. **Miller**. It was not.

Senator **Melcher**. And, as a consequence, the effect was a change of policy that, from Mr. Zehm's testimony and others, had been in effect for 25 years.

Do you have any further questions?

Mr. **Marlenee**. Yes, Senator. I do have a couple of closing comments.

I want you to know, those of you who are assembled at the end of the table, that these kind of questions and hearings are not pleasant for us at all. We have got a lot of other things that we could very profitably be doing. There are no secrets in Washington, DC. Whether you're out on a boat or whether you happen to be doing something else, there are no secrets whatsoever in Washington, DC.

I have my doubts that there was some covert action to lower the price of gain. But I also want you to know that we appreciate the dedication and the long term of some of the people that have served our producers and served USDA and served the United States in working in the bureaucracy.

The question we now come down to, I believe, is if there were errors, and I think there were—I think maybe there were some inappropriate overt actions—not covert actions—that were done fairly well in the open, how do we correct those, and how do we go on to obtain the most—the highest price and premium for our producers. I think that is the important thing—and make the most sales that we can abroad.

Mr. Miller, you said a change in the baseline or biasing over the baseline, that with regard to that, on June 15 there was an order of up 0.1 of 1 percent. And I believe I heard you say that a new September baseline formula would raise it another 0.1, and that the two taken together would add back 0.2 of a percent.

Now, there are a lot of inconsistencies that I still don't understand. But what I am trying to point out is that let's get the action done, and get it done immediately, to correct any error or any inappropriate direction that may have occurred and still exists. That is what we want.

Mr. **Miller**. May I respond, Representative Marlenee?

I appreciate what you are saying, and we're going to do that. We had planned originally to implement the new calibration equation for Hard Red Spring Wheat on August 1. But because of some complications that developed, we ran into some delays.

But we now have the recommendation of some outside people that have looked at it. They agree that we should go ahead with it as quickly as possible to implement it. We intend to do that. The implementation schedule will take approximately 5 days to 2 weeks because of the amount of data that needs to be transmitted back and forth between the people in the field and our Kansas City based Quality Control Branch.

But in terms of the impact on the system, I don't want you to be left with the impression that our action will result in an automatic increase in the baseline of the reference samples. I don't think any of us, either around this table or anyone from some of the outside organizations that are here today, knows positively what the impact of the new, more accurate calibration equations will be on every service point providing protein analysis. It will be impossible to know the impact until the equations are put in the instruments.

I think the comment that has been frequently made here today, that all of a sudden, whenever the new calibration goes into effect, we are going to automatically raise the baseline by a 0.1 of a percent or some other number is not correct. I caution people not to anticipate that because that may not happen.

Mr. **Marlenee**. Let me outline to you one other kind of inconsistency, and what I consider a ridiculous position, and you may consider this, and that is that we don't do the calibration on the machines. You are in the business of looking after the needs of the producers, looking after the protein tests and testing equipment. I don't think I would turn that over, necessarily, to just the—to private industry or to the manufacturer of the machine to see that that calibration and accuracy is carried out.

Mr. **Miller**. We are not doing that. FGIS is doing the statistical analysis and testing with the help of our sister agencies ARS and AMS.

Mr. **Marlenee**. I thank you for appearing before us.

Senator, I appreciate having the joint hearings, and I hope that some resolution can soon be forthcoming.

Senator MELCHER. Mr. Rogers, I did ask you to stay for questions by Congressman Marlenee, but he tells me that he has asked the questions of these witnesses. Is that true?

Mr. MARLENEE. Well, I asked the questions. I had some question of his statement. His statement seemed to come across like, "Hey, we got to do this thing," and "If we have tests here within the United States, there can be an appeal process." And then we see the data on the back sheet, where we have inconsistencies and, yet, I have some question about how we verify those inconsistencies. There seems to be no appeal process.

Senator MELCHER. With foreign testing?

Mr. MARLENEE. Yes.

Mr. ROGERS. I understand your concerns there, but the appeals are for the domestic trade. In other words, if Vancouver, Washington, was testing low 0.1, the shipper there has the privilege of going to Olympia; if he didn't like that protein, he went——

Mr. MARLENEE. I understand that.

Mr. ROGERS. And there were many, many, many cars during that period of time that were appealed, which is a lot of extra work for us. In the meantime, we, as an exporter, have shipped that grain out on Vancouver protein levels, if you follow what I am saying. It came in on Vancouver, if they are 0.1 lower, we ship it out on Vancouver, same machine. The shipper from the country has the privilege of appealing that to Olympia. If he don't like that—or we can, either one—go on to the board for the final appeal which, many times, takes 2 weeks before we get the results back.

So what I am saying is that if the Washington machine was low during a month or 6-week period, which it could have very well been, many, many, many of those shippers were appealing that grain and getting paid—not on the Vancouver results. They were getting paid either on the Olympia or the board results. They were not getting paid on the Vancouver results.

Mr. MARLENEE. All right. Let me, then, as long as you brought it up—you can verify, through Olympia or through Kansas City, if you have a question of the proper protein content. But you listed, on the last page of your testimony, a series of protein tests, loaded protein tests and landed protein tests.[1]

Now, I am not about to take the word of some foreign testing company that we are 1 percent higher than what had tested when it landed.

Mr. ROGERS. Well, I think that should be investigated, that those are true figures that we received as complaints from the people that receive that grain. Now, I'm not here to verify the accuracy of their machines. Part of those are the Kjeldahl——

Mr. MARLENEE. Well, if you are going to use the data and we are going to use that as a basis for recalibration in the United States of our own producers' grain, then I think it's a damn important point.

Mr. ROGERS. It certainly is. I think it is something to look at, and that is what the FGIS should be looking at, and did look at.

Mr. MARLENEE. It would seem to me that once that grain is shipped, we should have the same fail-safe mechanism to test or retest what had been shipped out to see, in fact, if their allegations are correct; and if they are not correct, they can go fly a kite.

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[1] See p. 208 for material referred to by Mr. Marlenee.

Mr. **Rogers**. Well, I thought maybe that we had collaborative exchange of samples. Somebody else would have to verify that. I am not in that end of it. We just have to deal with the complaints, and we pass the complaints on.

Senator **Melcher**. You do exchange samples, do you not, Dr. Watson; and they are done by the same method, chemical method, Kjeldahl.

Dr. **Watson**. Yes.

May I make one comment? Maybe I am speaking out of turn here. But in regard to the exchange of samples, we exchange samples with the Japanese Food Agency on a periodic basis. And over the past several years, our Kjeldahl method has agreed on over 100 samples a difference of zero. So we are in complete agreement with them on our Kjeldahl method.

In regard to the samples and the complaints from overseas, and the bias adjustment that was made—or the baseline adjustment that was made in April, we had several hundred samples that we had sampled on ship lots at origin and at destination showing, indeed, that our NIR's were high. And that was just not on a very few samples, it was on several hundred samples, to verify that there should be an adjustment made.

Mr. **Marlenee**. Did you recheck them?

Dr. **Watson**. We ran the analysis, yes, in our laboratory in Kansas City and it did, indeed, show that the NIR's on the west coast were high.

Mr. **Marlenee**. I am a bit more comfortable then.

Dr. **Watson**. It was not just 100 samples. I think there were several hundred. About 700, I believe, or something like that that we ran, so there was a considerable number of samples to verify this.

Now, in regards to the baseline change, I wanted to make one comment here because I think I made the wrong impression. I disagreed also with the baseline change, on April 15, across the board. I thought that should have been done on a location-by-location basis, because I didn't feel that all locations were running high on protein.

At that time, we did not have national reference samples and there was only certain locations, I believed, were running high; and it should have been done on a location-by-location basis and not across the board across the United States.

Mr. **Marlenee**. Well, I wish to tell you, on the moisture, 12 moisture basis formula, that we've got to get out there and cut some wheat and grain. That's all there is to it. It doesn't keep well, you know, and it's not quality grain. But if that's what they want, I guess we've got to cut it with a lot of moisture.

Senator **Melcher**. Thank you for clarifying that, Dr. Watson.

Mrs. Martinez, we haven't asked you any questions, but we are very interested in what your task force is—the goals you have, and we wish you all Godspeed in your endeavors, and the rest of the task force also.

Mrs. **Martinez**. Thank you.

Senator **Melcher**. I want to thank all of you for your testimony here today. We will keep this hearing record open for 2 weeks for any further comments by any interested party.

The subcommittee is adjourned.

[Whereupon, at 1:50 p.m., the subcommittees were adjourned, to reconvene, subject to the the call of the Chair.]

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